



The Best Way to Connect

We Review 22 Paths to the Internet

NETWORK EDITION

5 New Ways
To Manage
Power to
A Network



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Options

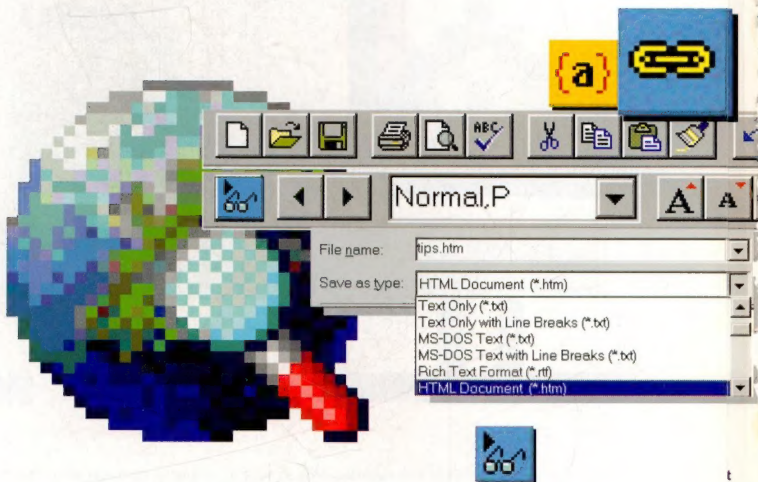
SUITE PEEKS

PC Labs Previews

Microsoft Office 97,
Lotus SmartSuite 97, and
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Edition

Inside

One of the biggest challenges we face at *PC Magazine* is keeping our readers abreast of the incredibly fast-moving introduction of products and services to our Internet-frenzied world. Fortunately, our networking and communications team is up to

the task. This team is big; it has some of the most experienced journalists in the business, and it includes what is widely recognized as the best, most extensive product-testing labs in the networking world. And as perhaps befits a group dedicated to cov-

Jennifer Anderson. Todd's partner and counterpart in our West Coast networking labs continues to be project leader Jeff Witt, who is backed by technical analyst Amy Leung and support technician Andrew Go. The team also benefits from the continued direction of Frank J. Derfler, Jr., our most senior networking editor; Steve Buehler, our West Coast Labs director; and Leon Erlanger, newly promoted to the position of senior editor for networking and communications.

Despite some new faces and new titles for some of the old hands, the team members are already hard at work. You can find their early handiwork in this issue, for which they anchored a group of almost 2 dozen researchers, testers, analysts, writers, editors, and illustrators to produce two in-depth articles on connecting to the Internet. The articles provide detailed reviews of 22 products and services that let you connect to the Internet, whether from home or office, whether over dial-up lines or direct network connections.

Given the pace of Internet product development, the team has a lot of work ahead of it. Fortunately for us, in a world that requires us to run full speed just to keep up, this team is already out of the blocks.—*Jake Kirchner*



New faces and old hands: David Lambert (left), Leon Erlanger, and Todd Spangler.

ering the fastest-changing market in the business, the team has gone through a reorganization of its own of late.

Recently promoted to the team's leadership position is associate editor Todd Spangler, a two-year veteran of the *PC Magazine* networking trenches. He's joined by new staff editor David Lambert and new editorial researcher

PHOTOGRAPH BY THOM O'CONNOR

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This is your mother.

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OmniPage Limited Edition is the OCR that came with your scanner. It gives you basic OCR.

How to Improve Your OCR Accuracy and

Caere Corporation (NASDAQ: CAER) recently announced an upgrade that makes the OmniPage Pro optical character recognition (OCR) major software resellers for an estimated street price of only \$129. This is an inexpensive way for scanner users to step up to fully-featured OCR product (including those bundled with flatbed and edge feed products) can upgrade to the full version of OmniPage Pro at a \$37

OmniPage Pro has a separate upgrade package available through Computer City, Egghead, and Best Buy. Since the vast majority of Caere OCR, most scanner users are eligible to upgrade at this great

The large number of scanner manufacturers that bundle Caere OCR products are being used for integration (IBM, Microtek, Canon, Planitex, Umax, Nikon, Agfa, Logitech, Reticon, etc.) are eligible for the upgrade.

The upgrade program includes OmniPage Pro 6.0 (Windows 3.1 and 7.0 (Windows 95), which offer all the capabilities of the bundled software for extended functionality. Most notable among them are the "zoning" and preprocessing of scanned images, verification of the Page technology for the retention of the original page formatting, as OCR training and deferred processing capabilities.

The Changing OCR Market: In the not so distant past, OCR required more and OCR software that was often difficult to use and provided These issues were frustrating and limited the use of OCR to high-volume vertical markets. The use of desktop OCR was limited to the

"Today, several trends are contributing to the widespread use of OCR users faced," said Chad Kinzelberg, Caere's vice president of the program is another major factor that will promote the use of OCR, occasional OCR user will find Caere software more attractive because

Analysts following the OCR market agree that OCR use is on the industry trends promoting its mainstream adoption:

Higher Customer Awareness: An increased number of computer users are time and money saving benefits it provides.

Higher Scanner Penetration: Scanners prices have dropped drastically many flatbed grayscale scanners available for under \$500. Also, attention (such as the small-footprint sheet-fed scanners) and multifunction

Increased OCR Accuracy: OCR developers have developed high-accuracy OCR technology for increased output. The greatest improvement has been made on degraded and hard to read documents.

Improve Your OCR and Save Big \$\$\$

Higher Scanner Penetration:

Scanners prices have dropped drastically in the last few years with many flatbed grayscale scanners available for under \$500. Also, attention, new scanner form factors (such as the small-footprint sheet-fed scanners) and multifunction devices have entered the market.



Low cost scanners entering the market help help push OCR use to a new level

Increased OCR Accuracy:

OCR developers have developed high-accuracy OCR technology for increased output. The greatest improvement has been made on degraded and hard to read documents.

Pricing and Availability

OmniPage Pro 7.0 (Windows and Mac) and WordScan Plus 4.0 (Windows) upgrade packages are immediately available at major resellers for an estimated street price of \$129.

The Company:

Caere Corporation, with U.S. headquarters in Los Gatos, Calif. and European headquarters, Caere GmbH, in Munich Germany, is a leader in OCR technology and desktop document management products. Caere has recently expanded its product line of OCR

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continued on next page

OmniPage Limited Edition

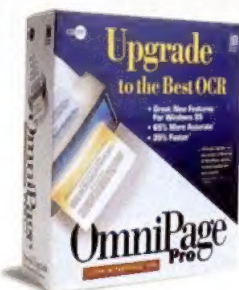
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www.caere.com

Key Feature Comparison	OmniPage Pro	OmniPage Limited Edition
Caere's fastest and most accurate OCR engine	✓	
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OCR Wizard to guide you through the process	✓	
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OCR from within your favorite applications	✓	✓
Retains original layout	✓	

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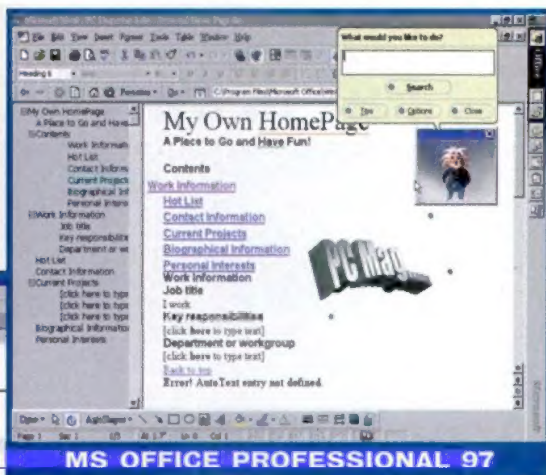
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Pumping Up Your PC95

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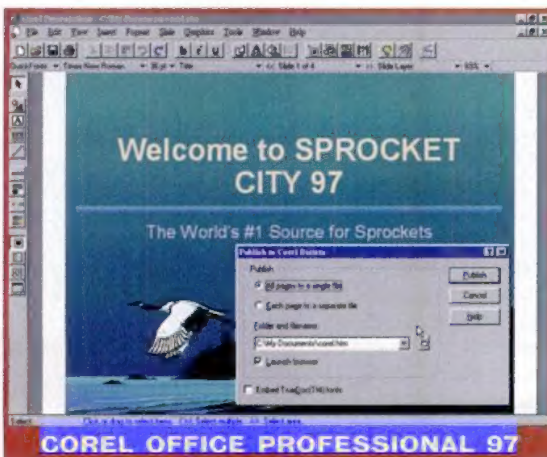
Software

Suite



Peeks

BY MICHAEL J. MILLER At long last, the suite manufacturers are putting their best feet forward and presenting us with prerelease versions of their latest upgrades. In a special preview, we take a sneak peek at three of these products—Corel Office Professional 7, Lotus SmartSuite 97, Microsoft Office Professional 97—and examine each one for its application integration/common code, Internet tools, collaboration features, and programmability. In sidebars we discuss the latest features of the suites' components: word processors, spreadsheets, databases, and presentation graphics. We also offer a table that shows you what you'll find in these new suites compared with what's in their older versions. All in all, our preview of the next generation of application suites will help you decide if your present set of business applications still suits your needs102



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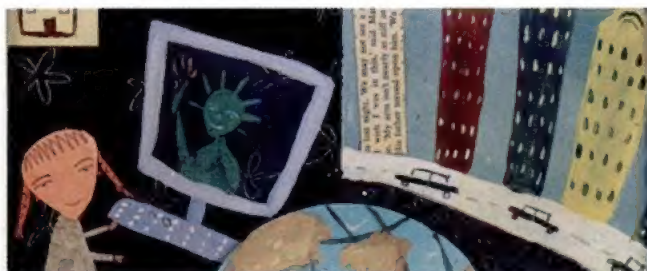
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Internet Services

The Net Grows Wider



BY TODD SPANGLER As the Internet expands, your options to connect to it are also multiplying. We review 17 services that offer Internet access nationwide: 5 online services and 12 Internet-only providers. We rate their software, features, pricing, and connection options.....147

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Link Your Network To the Net

BY PADRAIC BOYLE There's no doubt that the Internet is a vital business tool, but connecting to the Internet from a LAN raises a nasty clot of questions for network administrators. PC Magazine Labs tests three turnkey gateways that make it easier to connect IPX-based networks to the Internet, translating between IPX and TCP/IP. We also look at two software-based IPX-to-IP gateways and explore options for using native TCP/IP on the network191



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Personal Investment Software: Investment 101



BY KATHY YAKAL If you're going to take on Wall Street with your PC, you may need some help. We look at seven Windows-based personal investment software packages that help you track your portfolio and keep it up-to-date via online links. We also take a quick look at the evolution of expert analysis tools for market tracking, an online service dedicated to the world of finance, and a very useful investment Web site.....341

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Internet Tools

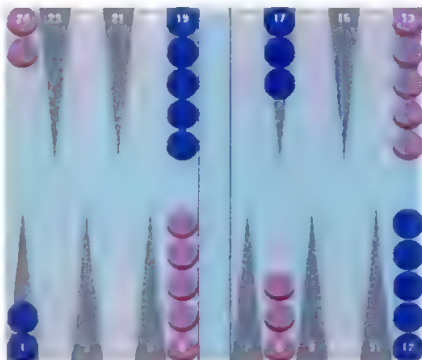
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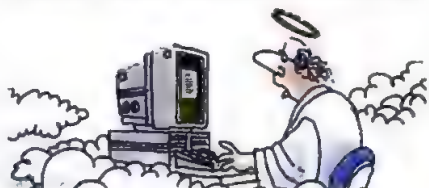


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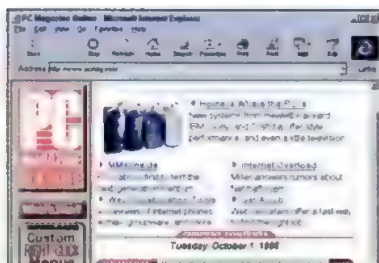
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WHAT'S NEW ONLINE

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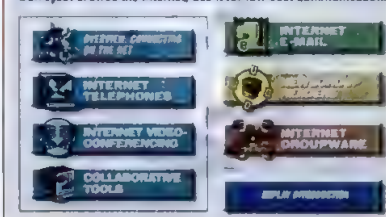
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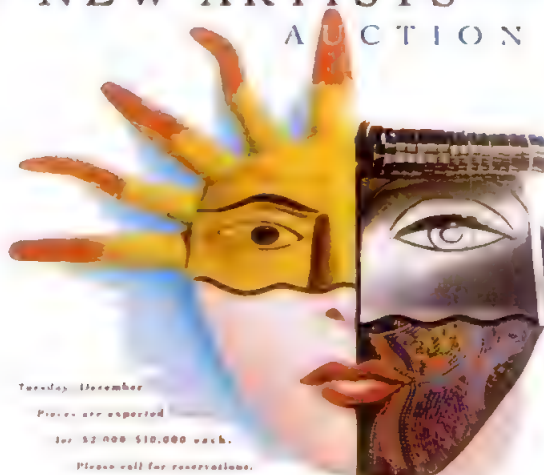
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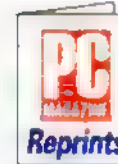
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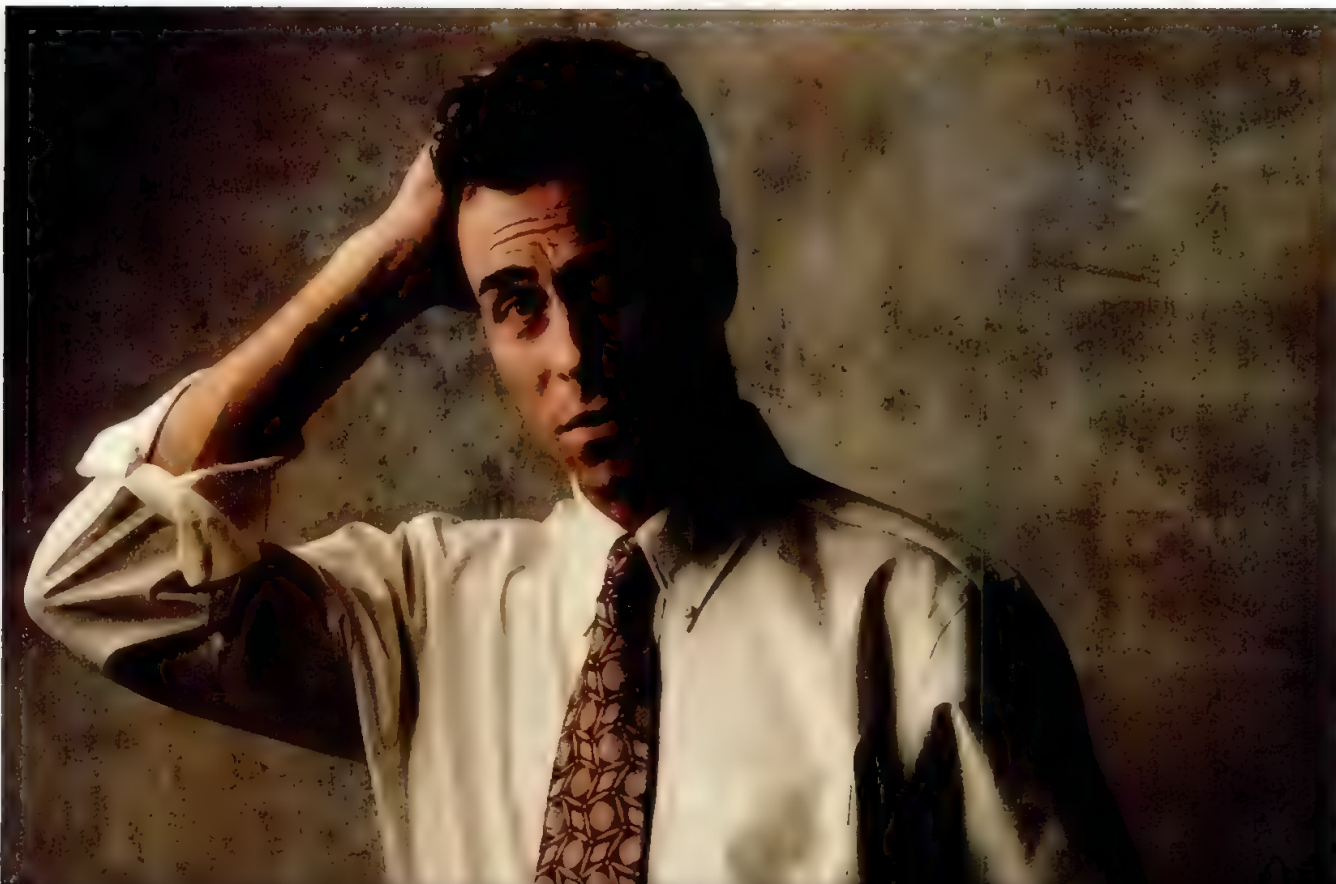
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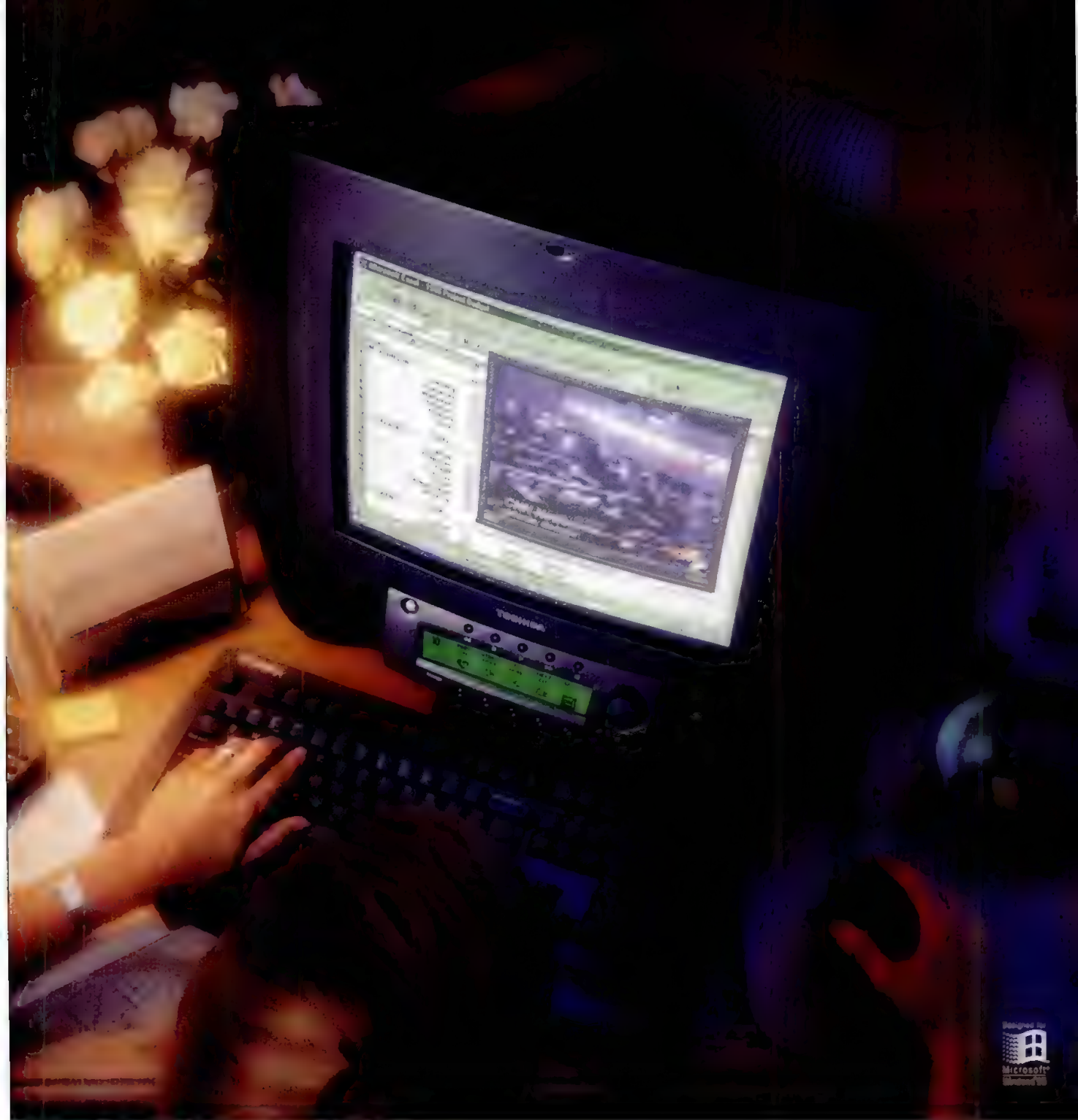
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Letters

GOOD SHOT, NO BULLS' EYE

I was very happy to see your August 1996 cover story, "Portable Property." The information it contained was comprehensive and excellent—a good attempt at covering all the aspects of this growing market. However, I would like to have seen an indication of Windows NT compatibility. It seems that as the popularity of Windows NT grows, end users find their Information Technology departments using it, then want their notebooks to have the same operating system.

J. MICHAEL KERZEE
Houston, Texas

Windows NT is not a very notebook-friendly operating system: Neither Version 3.51 nor 4.0 offers power management, PC Card support, or infrared ability.—Ed.

I found a few things lacking in your reviews of notebooks. I don't have an unlimited budget and can't afford to spend \$5,000 to \$7,000 on a top-performing notebook. On the other hand, I can't spend all my mobile computing hours squinting at a small passive-matrix screen on a system that has cramped features and less-than-adequate speed. Though your charts and benchmark tests were helpful, I found myself wondering what's the very best that I can afford and finding no concrete answers in your roundup.

MEIR ROTH
via the Internet

I can't forgive the oversight you made in your notebook roundup by not addressing the issue of docking stations. Simple things about docking systems such as ease of use, durability, reliability, repair cost, upgradability, and compatibility with the next generation of laptops were completely neglected.

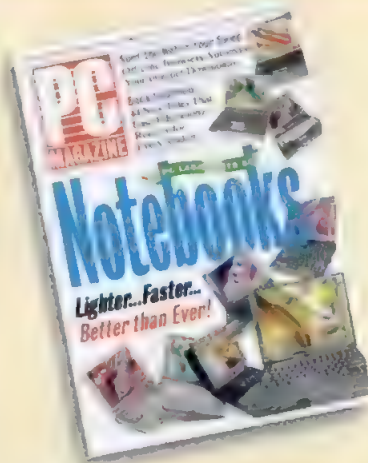
JOE FOSS
via the Internet

Your recent review of notebooks was comprehensive and informative. What I found missing was any indication of the availability of specific models. For example, I've been trying to purchase an IBM ThinkPad 760 for several months, but to no avail.

ZOLT LEVAY
via the Internet

Issues that let people keep up with what's happening in the notebook market are certainly helpful, but I failed to see any mention of one of the main things that's kept me from buying a notebook so far: the problem of finding an inexpensive and user-friendly hard disk backup for a notebook.

DALE LUNDY
PC MagNet



"Your review of notebooks was informative, though I found a few things lacking."

WHAT'S MOST IMPORTANT?

It's disappointing that I can never get the kind of battery life advertised by vendors. I use a notebook nonstop and typically get less than half the advertised battery life. It would be nice if you tested notebooks with no time-outs so that we could compare the battery life of the various notebooks under continuous use.

JIM TWINING
via the Internet

We agree that many of the vendor-claimed battery life numbers seem inflated compared with normal use. Our new battery test ZD BatteryMark delivers results much closer to a user's battery life experience for typical operation. The test runs with the notebook's power management facilities enabled but keeps the screen active for the full duration of testing; it does not permit standby, sleep, or hibernation modes to be entered but does include "think times" interspersed between CPU graphics and disk operations to simulate actual user operation. BatteryMark is described fully in Lab Notes (August 1996) and is available for a nominal fee from Ziff-Davis Benchmark Operation (919-380-2800).—Ed.

I was amazed to see that your notebook specifications continue to assume that an integrated battery is more important than an integrated AC transformer, and that an integrated CD-ROM drive beats out a backup device. The idea that most users spend their time in airplanes playing a selection of CD-ROMs seems to me a fantasy.

NICK SAVAGE
via the Internet

PROJECTIONS OF POWER

You seemed to miss a major need of most laptop users—the projection-panel-based presentation. Most projection systems in use have 640-by-480-pixel displays. This creates a problem for some notebooks, including the Toshiba Tecra, which runs at 800-by-600 resolution. Though you did mention the virtual desktop feature that allows an external monitor with higher resolution to run simultaneously, the problem is that when the external display is set at a lower resolution, the Tecra reduces the image to a small window.

OPHER BANARIE
via the Internet

I think your rave reviews of the IBM ThinkPad 560 were premature. Although it is a great machine, it has one fatal flaw: You can't simultaneously display your presentation on the LCD panel or a video projector that supports 640-by-480 resolution.

MIKE SLUBOWSKI
Southfield, Michigan

DEFINE "AVERAGE"

I am a thoroughly frustrated network manager who has purchased some Toshiba Satellite 410 CDT notebooks. Considering that I was on hold for 45 minutes on my first call to them, was hung up on and then put on hold for an additional 45 minutes, I was shocked to see that you gave Toshiba's technical support a better-than-average rating.

YONG CHUNG
via the Internet

LIKE A CAR WITHOUT A DRIVER

Your review of PC Card accessories for notebook computers in the August 1996 issue didn't mention that the IBM 3D PCMCIA Sound Card doesn't ship with drivers for Windows 95 ("The Top 35 Portable Peripherals"). According to IBM's technical support personnel, IBM has no plans to develop such drivers now or in the future.

FRANK TAM
via the Internet

A LITTLE HELP FROM SOME FRIENDS

John C. Dvorak's August 1996 column, "OS Decay: Here to Stay?", mentions the cool sliding bar at the bottom of a Cyrix P166 PC. This may have been caused by a nonstandard version of Windows 95. Adding the Plus Pack gives you effects like those, but a bootlegged copy of Windows 96 will make menus slide out like the task bar.

HERNAN ORELLANA
via the Internet

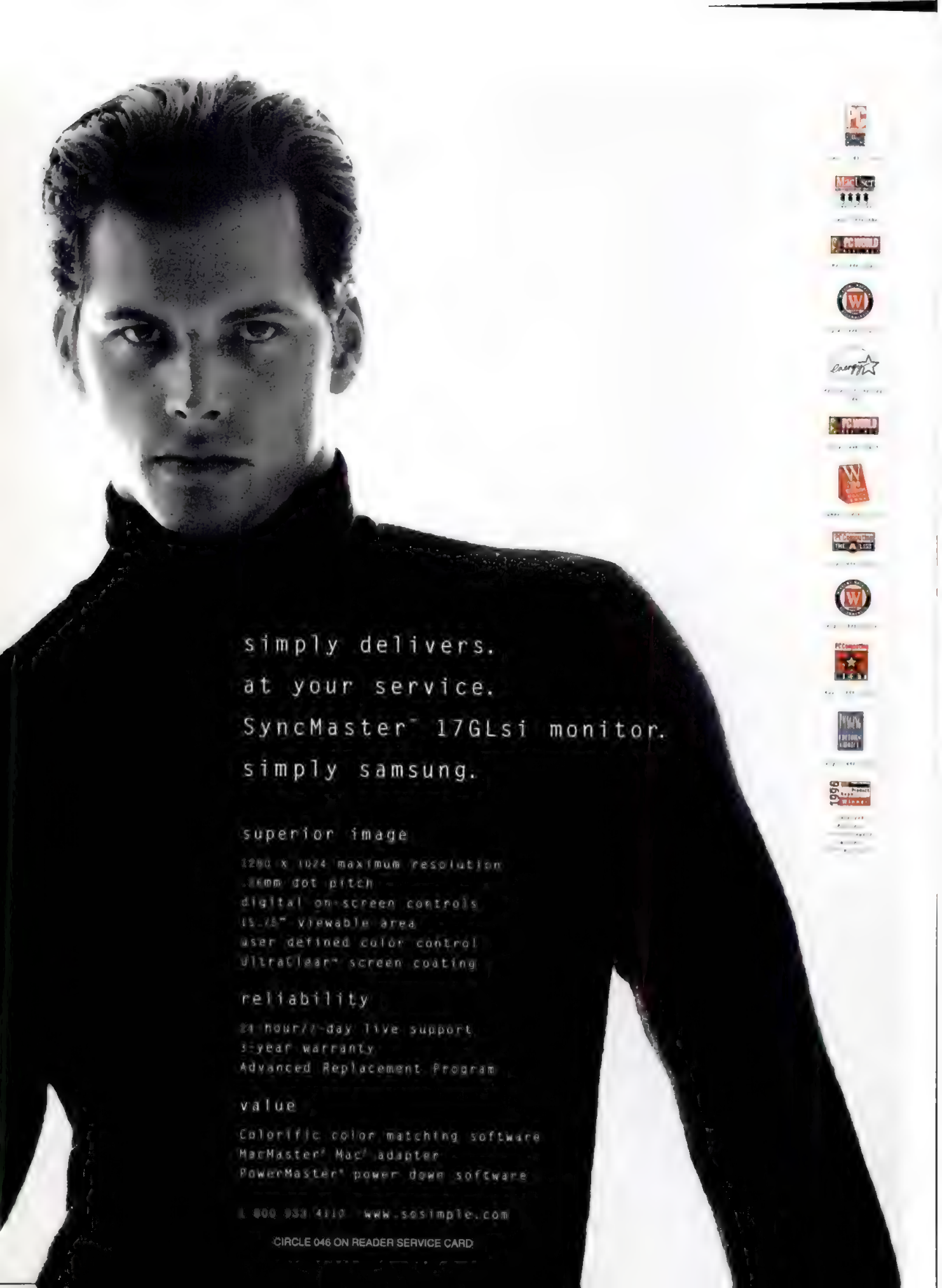
In regard to Dvorak's comments on the state of operating systems these days, what can he

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Letters

expect from Microsoft? Many of the products that the company has released in the past have been flawed. Take Windows 95, for example: The print spooler frequently crashes, the driver system is a mess, and the GPF errors that were supposedly fixed have simply been renamed: They no longer cause a system-wide crash but instead consume system resources until you reboot.

DEREK CHOATE
via the Internet

SERIOUS BUSINESS

Jim Seymour's column "The Big Business Upgrade" (September 10, 1996) confirms that the Microsoft/Intel fiasco continues. I think that Windows 95 was just a Band-Aid to buy time for Microsoft so that software products and Intel's Pentium Pro could be developed for Windows NT systems. These two companies seem to love keeping PC users in a state of angst. In the meantime, OS/2 Warp works really well on my 486DX2/50 PC, and I have the best of both worlds, old and new. To companies marketing products they know will be replaced in less than a year's time, I say hit the road.

CHRIS YOUNGS
via the Internet

I believe Jim Seymour has made a basic error in his analysis. When the first networks were installed, they were inexpensive on a per-station basis, and there were no reasonable alternatives. By contrast, Windows NT is expensive on a per-station basis, but now there is a good alternative. Where the robustness of Windows NT is required and the protection of

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CORRECTIONS AND AMPLIFICATIONS

In our September 10 roundup of HTML authoring tools, "Web Authoring" (page 115), the Summary of Features table contained several errors with regard to GNNPress (since renamed *AOLPress*). AOLPress does offer FTP support (via the Save As menu choice); it does support HTTP Put, and it includes basic host directory management capability.

In the New & Improved article "Online Services Get a Facelift" (September 24, 1996, page 75), we incorrectly listed the number for CompuServe. The correct phone number is 800-524-3388.

data is critical, Windows NT will rule, but only 10 to 20 percent of computers fall into this category. The majority of systems in the average organization can be transferred to a corporate intranet, which is fine for non-data-critical applications.

STEPHEN WELLS
Greenwich, Connecticut

SELLING HIGH

In his Inside Track column (September 10, 1996), John Dvorak asks why IBM doesn't put out a catalog for all its unusual equipment. The answer is because it would bankrupt the company. I called to order the \$39 port splitter he so kindly mentioned and was put on hold (at their expense) for an extremely long time going through two separate menu choices and talking to three separate people. I suspect that this was not because the site was too busy, but because it was designed to be convoluted.

JOHN SEIFFER
via the Internet

THE BEST POLICY

PC Magazine should be commended for Michael J. Miller's September 10 column disclosing the financial ties between Ziff-Davis Publishing Co. and some software vendors. I agree that a publication's willingness to disclose potential conflicts gives its readers greater confidence in its reviews. Disclosure also silences critics somewhat because it allows each reader to decide for him or herself whether the editorial selection or presentation is fair or biased.

ROBERT MCMILLAN
Boonton, New Jersey

FEATURE HAPPY

Thanks for your informative First Looks review of Netscape and Internet Explorer ("Microsoft Takes the Offensive in the Browser Battle with Netscape," September 10, 1996).

Although I currently use the IBM OS/2 Warp browser, I was interested in reading about the new features I may migrate to when Netscape releases its OS/2 version of Navigator 3.0. A feature I hope will be adopted is one I've grown very attached to with the Warp browser—that is, the ability to create a URL object.

BRENDAN CONNER
via the Internet

KIDS AND COMPUTERS

In his September 10 column, "Married, with Web-Surfing Children," Jake Kirchner bemoaned the fact that only 14 percent of children from poor families have computer access. Now, while I don't believe my father when he says he walked 22 miles to school in blizzards, it is absolutely true that in 1970, my school had one time-sharing terminal, which was regularly used by maybe ten out of 1,000 students. But I'm not convinced that anyone suffered much from "lack of computer exposure." If we experienced pain while later getting up to speed on the first PCs, it was probably due more to poor user interfaces than to any other factor. As an employer, it's my view that anyone intelligent enough to be worth hiring can learn the mechanics of computer use within a few weeks, assuming that they're given a little help.

DOUG CANTER
via PC MagNet

After reading Kirchner's column, I couldn't help feeling a little confused and angry. It seems as if his underlying message is that we need some sort of regulation of the Internet, but his rationale seems flawed. I think that in the long run, all we can do as parents is to provide the kind of role models we want our children to emulate and then cross our fingers. Not only can we not monitor their activity when they are children, but at some point we have to trust that they will become responsible adults. The government will not provide a better direction than the one that parents provide. The answer does not lie with censorship.

LESLIE KOORHAN
Stanhope, New Jersey

PICTURE THIS

Regarding Bill Machrone's September 10 column, "Getting the (Digital) Picture," although it is wonderful to see falling prices and greater resolution with today's digital cameras, Machrone failed to mention that the only way to get inexpensive, high-quality digital images is to shoot them first in 35mm and then have the image scanned into a Kodak PhotoCD. The PhotoCD scan is sufficient to generate a 7-by-10 image in at 300 dpi, which looks pretty good even on an ink jet printer with glossy paper.

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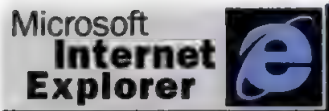
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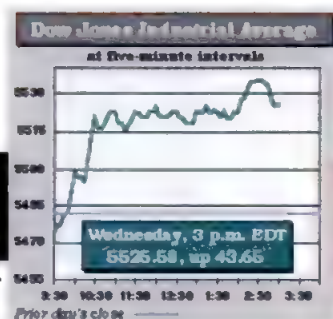
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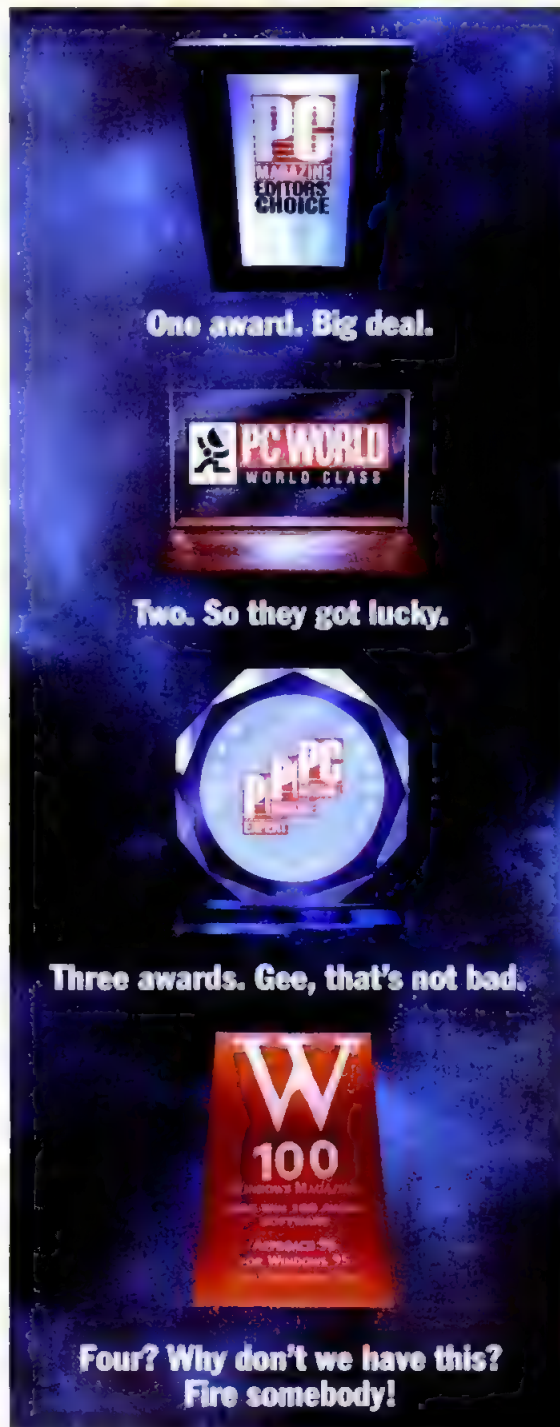
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Will Suites Get Downsized?

Productivity suites have come a long way. Look at the new versions previewed on page 102: You'll see more functions than ever before, better integration, and more collaboration and Internet features. Still, productivity suites have yet to deliver truly what

was once seen as one of their key benefits: the use of component architecture to allow end users to customize applications.

When Microsoft's Object Linking and Embedding (OLE)—and component strategies in general—were being promoted, the idea wasn't that they would simply tie together a single vendor's offerings. Instead, component architecture was touted as a method by which users and corporate developers could tie together individual applications in ways that made sense for a user's or a company's particular needs.

We've seen a little of this already, of course. A lot of the smaller vendors are making their programs "Microsoft Office-compatible": The programs plug into toolbars and use the Binder that is part of Microsoft's suite. But that's a far cry from being able to tie Lotus 1-2-3 and Microsoft Word together into one seamless custom application. You have more options if you're a developer in an environment like Visual Basic, where Microsoft's component plans have come to fruition. These VBX—then OCX, and now ActiveX—components do provide many benefits, but they are still primarily of interest to developers and not to end users.

In that regard, component software ran headlong into the juggernaut of office suites, where the pieces grew larger instead of smaller. But now that we've entered the world of the Internet, people want to download documents and applications, and they just aren't going to wait for a file that's hundreds of megabytes in size. Suddenly, smaller components are all the rage again.

Microsoft has now positioned its ActiveX as a solution, and certainly that works if you have Windows applications. (To try it, load Microsoft Internet Explorer 3.0 and instead of typing an Internet address, type the name of a .DOC file you have on your hard disk or server.) While an intranet may run on a single platform, out on the larger stage of the Internet, pages are supposed to work on any platform. And that's where OLE and even ActiveX run into problems. An application can be cross-platform—even cross-language—but it requires code so that it can be recompiled on each platform. It would be one thing if the entire world were running 32-



SIZING UP SUITES
Component software ran straight into the juggernaut of office suites, where pieces got larger.

bit Windows, or even if there were a limited number of platforms. But that's not a generic solution. Even putting some of ActiveX under the control of an open body won't change the essential nature of it. The same is true for old Microsoft competitors like OpenDoc and SOM.

Java and its derivatives are fundamentally different. Let's be clear: Java is *not* a cross-platform solution. Instead, it is positioned as a platform-independent solution. From a development standpoint, there's a big difference between the two. With something like ActiveX or OpenDoc, developers have to recompile or port components from one platform to another. Under JavaBeans, the new component architecture being added to the Java specifications, a developer could write a component once and it would work on every platform. JavaBean components could plug into platform-specific architectures, such as ActiveX or OpenDoc, or they could plug into one another.

Of course, some of this is just semantics. Java is not really platform-independent—it, too, requires a particular platform, the Java virtual machine. The Java VM is actually added to other environments, whether within a browser or in the operating system itself (as in the newest version of IBM OS/2 Warp).

To make the platform-independent idea really work, JavaSoft has to get the Java VM onto every platform, and, most important, make sure it works identically in each environment. That's no small order. And it effectively means that Java does become a platform.

Will Java and JavaBeans breathe new life into component architectures? It's too early to say. We are seeing a large number of Java applets, but those aren't really interoperable components yet. Lotus, with its new Lotus Components, and others have plans to move these applets to JavaBeans. Corel is working on a Java version of its WordPerfect suite.

But again, it's hard to know whether the end result will be general-purpose components or just add-ons to particular products like the Corel Suites, Lotus Notes, or even something from Microsoft. The time seems right for components, but it may turn out that the suite concept is more seductive. □



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Trends

TRENDS & TECHNOLOGIES SHAPING THE PERSONAL COMPUTER MARKET

MMX Put to the Test

PC Magazine Labs finds 20-percent performance boost.

Although Intel's P55C Pentium processor and its new set of multimedia processing instructions—known as MMX—will not officially debut until early 1997, they recently made an unexpected appearance on the benches of PC Magazine Labs.

This 200-MHz chip moderately outperformed a standard Pentium on our usual benchmark test suite; running under the industry's lone MMX-enabled software package, however, it exhibited greater improvements. But even in the latter case, the performance gains we saw did not meet those Intel claimed.

In late August, Hewlett-Packard shipped us its new home machine—the HP Pavilion 7295V—for inclusion in our First Looks section. As usual, we tested the system with the Ziff-Davis Winstone 96, Winstone 32, and WinBench 96 benchmark test programs. The machine performed rather well on several CPU-based tests, but we attributed such success to an optimized processor-to-memory subsystem—a strength that has often characterized Hewlett-Packard PCs we've tested in the past.

As the First Looks review for our issue of October 22, 1996, went to press, we conducted further tests on the Pavilion for an upcoming comparative evaluation of home PCs (slated for our issue of December 17, 1996). Those tests used updated versions of our benchmark test suites, Winstone 97 and WinBench 97 (due for public release in November). Unlike its forerunner, WinBench 97 can detect the presence of an MMX-enabled processor.

Detect it did. The discovery led to a closer inspection by PC Labs staff. When socketed, the P55C chip in the Pavilion is indistinguishable from a standard Pentium, and the layout of the Pavilion makes the chip particularly inaccessible. After dislodging the Pavilion's chip and removing its heat sink, we soon confirmed the finding: "w/MMX Tech" was stamped on both the front and the back of the chip. Hewlett-Packard says it unintentionally equipped the Pavilion

with the P55C, a chip that won't officially ship until early next year.

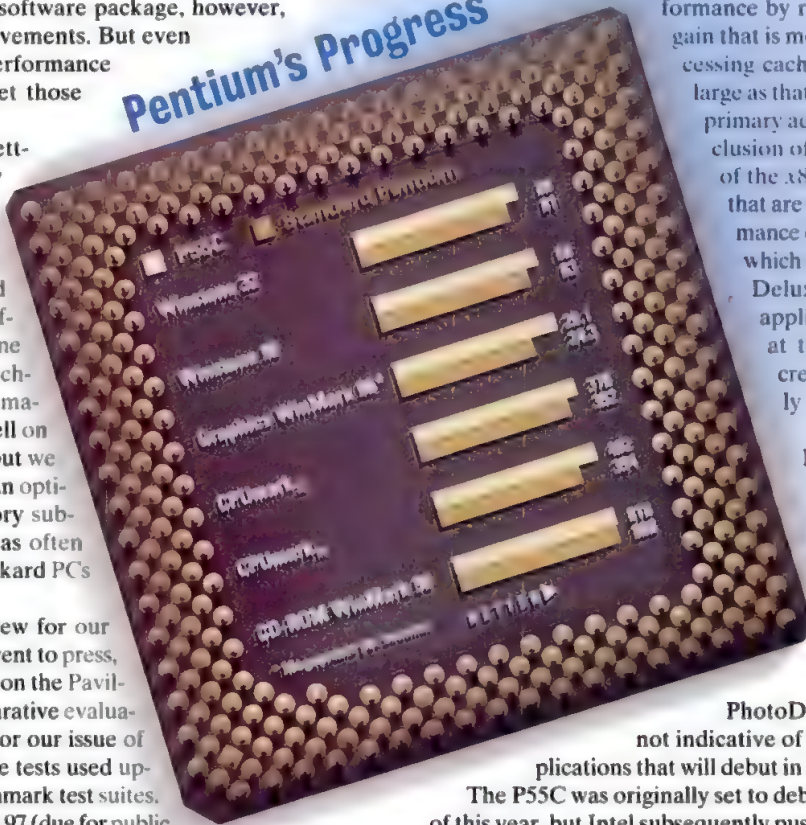
After making this discovery, we installed a standard 200-MHz Pentium in the Pavilion and retested—not only to correct the results of our First Looks review but also to examine the relative advantages of the P55C. On mainstream business and graphics applications, the P55C improved performance by roughly 10 to 20 percent—a gain that is mostly the result of an L1 processing cache of 32K, which is twice as large as that of a Pentium. Of course, the primary advantage of the P55C is its inclusion of MMX—several extensions of the x86 processing instruction set that are designed to boost the performance of multimedia applications—which we tested with Adobe PhotoDeluxe 1.0, the only shipping application optimized for MMX at the time. The new chip increased performance by roughly 20 percent.

Intel confirms that the P55C will boost performance up to 20 percent on non-MMX applications but claims that the chip will run MMX-optimized software over 40 percent faster and, under certain functions, will even double performance. Adobe

PhotoDeluxe, the company says, is not indicative of the kind of adept MMX applications that will debut in 1997.

The P55C was originally set to debut during the fourth quarter of this year, but Intel subsequently pushed back the introduction to sometime in early January. On this date, the company will most likely announce an MMX-enabled mobile Pentium processor as well. Its clock speed, however, will be 166—rather than 200—MHz. Soon thereafter, Intel will unveil its Klamath chip, a scaled-down version of the Pentium Pro that lacks an on-board secondary cache but adds MMX. The technology will then be included in all subsequent processors Intel releases. AMD has also announced that its forthcoming K6 processor will support MMX, and Cyrix's M2 is expected to be MMX-compatible as well.—Cade Metz

Pentium's Progress

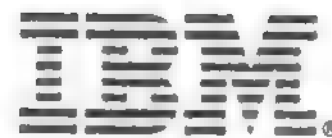


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What's Holding Up DVD?

Movie industry awaits copy-protection scheme.

As the holiday buying season looms, it looks less likely that one of the most eagerly awaited technologies of the year, digital versatile disk (DVD), will make more than a minor splash in 1996. While Matsushita, Pioneer, and Toshiba have announced plans to deliver DVD players this winter, a host of standards proposals—especially for encryption and copy-protection—are up in the air. Key players, including Philips and Sony, have confirmed that they will put off their DVD plans until early 1997.

A standard DVD disk can

hold 4.7GB of data—seven times the data capacity of a CD-ROM. Dual-layer disks will eventually mean even more capacity. The disks have potential for all kinds of uses in which CD-ROMs fall short, including video-intensive games and the ability to pack entire movies onto a single disk.

Unfortunately, the applications won't be forthcoming until standards agreements are ironed out. The film industry, for example, is waiting for an encryption scheme that will ensure that DVD disks containing movies can be copy-protected. At issue are technicalities regarding copy-



Modem Makeovers

New chips and software-only designs cut costs.

Modem costs are coming down significantly, thanks to new chip sets and to some brand-new approaches to modem design, including software-only modem technology.

Lucent and PC Tel have developed "host-based" modem chip sets that use a PC's microprocessor to handle such jobs as speech compression. And both General Magic and Motorola have developed software-based modems that use a computer's CPU instead of relying on other chip sets and on digital signal processors (DSPs). Off-loading some of the work onto the microprocessor and simplifying the design on a modem chip set can eliminate the need to put expensive DSPs and memory on the modem itself.

Lucent Technologies—formed as the result of AT&T's restructuring—has designed its 33.6-Kbps Apollo modem chip set with two chips instead of three—a highly integrated DSP and a coder/decoder known as a codec. The Digital Simultaneous Voice and Data (DSVD) feature lets you simultaneously discuss and edit documents over one phone line, for example, or play computer games with other online players while speaking with them.

Compaq is using the new chip set in its fall line up of Presario PCs. And last sum-

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- 10 **Remove-It 95** Vertisoft

*Source: PC Data. Data for August 1996.

mer, Motorola reduced the price of its Surfr series 28.8-Kbps modems—which use the new Lucent chip set—by 30 percent, to \$99. Meanwhile, PCTel has developed a 28.8-Kbps modem chip set based on host signal processing that supports data, fax, and DSVD in a single chip.

"DVD video for this year is becoming more and more unlikely," says Jan Oosterveld, president of Philips Key Modules. He says the demands of Hollywood and of the computer industry are competing for attention. "A

movie is made only once. It has, in certain cases, a lifetime of 60 years. It's exactly for this reason that the film community is protecting its intellectual property rights so strongly."

DVD technology continues to march forward even as the players argue over standards. Matsushita has shown three DVD systems, including a 28-inch wide-screen TV/DVD player. Pioneer and Toshiba say they too will deliver players before the end of this year.—*Sebastian Rupley*

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General Magic has also developed a low-cost approach to modems with its SoftModem software, which performs a full suite of 28.8-Kbps modem functions independent of the CPU. Philips plans to use the chip in its next-generation Personal Intelligent Communicator (PIC) chip set.

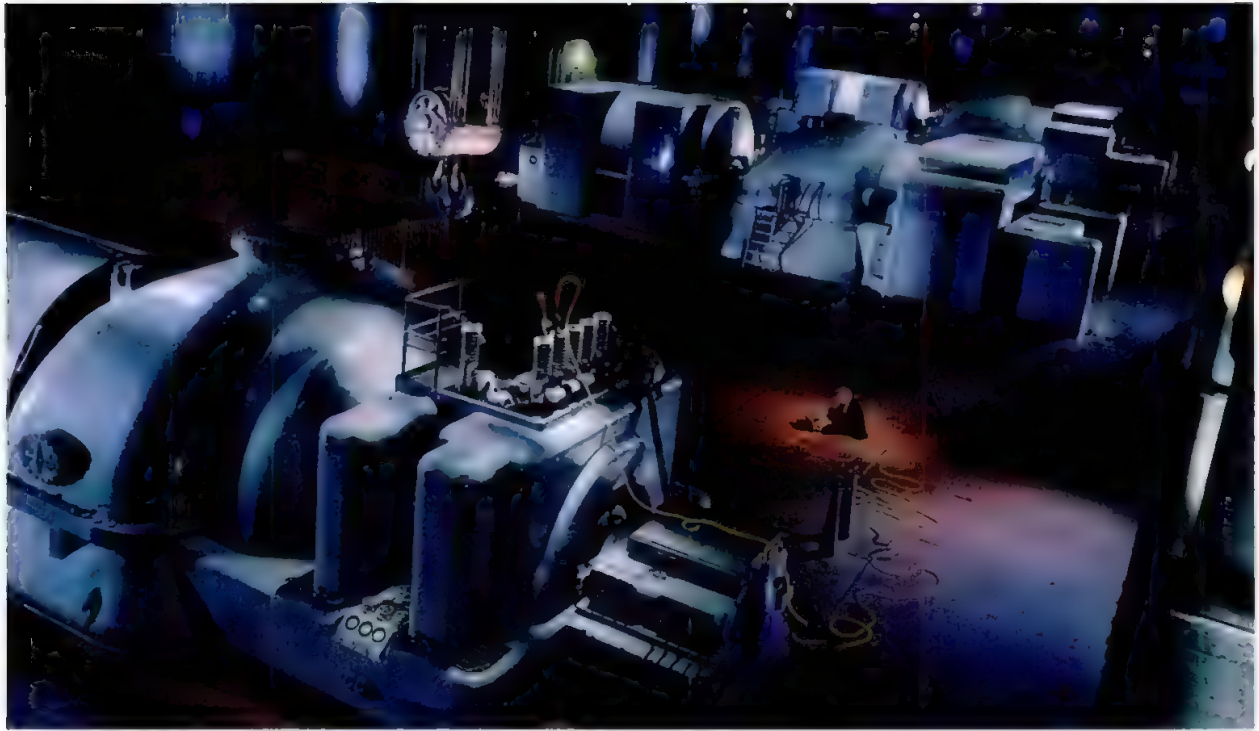
Motorola's Information Systems Group is also seeking manufacturers to back its new software-only modem technology, which—much like Intel's ill-fated native-signal-processing (NSP) initiative—relies on a computer's CPU. Patrick Casey, a Motorola marketing director, says the software modems will be available by the end of the year as an option on high-end PCs running at 150MHz or higher. He says

the first of the software modems will transmit data at 28.8 Kbps over analog phone lines and will later provide faster direct connections to digital telephone services.

Motorola's software-modem initiative is also positioned for hand-held devices.

According to Casey, "inexpensive software modems can eliminate much of the hardware currently dedicated to communications and could slash demand for current high-speed modems."—*Carol Levin and Sebastian Rupley*





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Invisible Input Devices

Experiments in thought-controlled computing.

Most people find having a conversation with a friend easier than manipulating data within a Microsoft Excel spreadsheet. That's why research into human/computer interaction seeks to make communication with a Pentium more like chatting with a pal.

People communicate using an intricate combination of vocalizations, gestures, and touch; having to use a keyboard and mouse is an obstacle to natural communication. The ideal input device, then, would be one you don't even know is there. To that end, products are being developed that recognize various types of input—even your thoughts.

Scientists at Carnegie Mellon's Interactive Systems Labs are experimenting with multi-modal interfaces, which incorporate several different types of input simultaneously. Such devices might monitor speech, movement, and the position of a user's eyes. The key here is that you choose the most efficient input for a particular task. For example, you might say, "Schedule a meeting," while pointing to a date on the calendar to mark the start and finish times.

But as Professor Alex Waibel notes, in order to succeed, "a multi-modal interface must be both flawless and robust." Anyone who has ever tried using a voice recognition system might liken the frustra-



tion of the experience to trying to give directions to a four-year-old.

Microsoft's Hardware group has also been working on developing several new interfaces. When asked about the viability of handwriting recognition today, Rick Thompson, vice president of the group, explained that attempts to produce a consumer product with current technology often end in a "glorified Etch-a-Sketch." But now, developers are investigating video games—because of the relative simplicity required for control—as a gateway into the market for new interfaces.

Microsoft recently acquired EXOS, developer of the force-feedback joystick. This joystick provides a tactile interface that lets gamers

feel the bumps and vibrations in a road, the recoil of a pistol, or a crash landing. As force-feedback technology—which was originally created for doctors and surgeons—improves, it could

become useful in any situation where touch is more useful than sight or sound.

Perception Systems has developed the ZON, an input device that uses motion-sensor technology to recognize gesture commands. Although the ZON will first appear as a gaming device, the company foresees applications extending from sports instruction to assistance for the handicapped.

The MindDrive tethers the rest of your brain to a computer. Created by The Other 90% Technologies, the MindDrive is designed to control action on the screen with only your thoughts. Fueled by bioelectric signals in your skin, you can think your way down the slopes in MindSkier or experience a spare from the viewpoint of the ball in MindBowling. These games are fun, but the real potential for this technology has yet to be realized.

According to Ron Gordon, president and founder of The Other 90%, the MindDrive is already capable of distinguishing six words as they are thought. But it will be many years before the MindDrive is viable for a spin around the block, let alone the navigation of wheelchairs and fighter planes.

Although the interfaces are still too novel and cumbersome to provide a seamless dialogue between human and computer, the advances of the next decade may make possible the truly invisible input device.—*Jeremy Olshan*

Net Access Guaranteed, Or Your Money Back

Service providers fortify backup systems.

Some companies rely so heavily on their Internet connections, a day of downtime can cost up to \$100,000. That's why they've been willing to pay extra for an Internet service provider (ISP) that offers extra-reliable service and support. BBN Planet, one of the leading ISPs for big companies, just finished off some significant improvements to its backbone, enough to offer a guarantee to its customers: Experience 15 minutes of downtime, and BBN will give you credit for a whole day.

By installing new Internet routing equipment (known as points of presence) inside telephone companies, BBN gets access to DC power and 4 hours of battery backup, which can

be crucial during a brownout. Some ISPs rely on uninterruptible power supplies that provide only 10 to 15 minutes of backup power.

In addition, all of BBN's backbone routers have a "redundant mate": if power goes down in one router, data flows to the other. BBN also has a backup operations center in Columbia, Maryland, that operates 24 hours a day, 7 days a week to monitor the network if the Cambridge center goes down.

The result of these fortifications is 99.9-percent availability, says BBN. One caveat: the guarantee covers failures only within BBN and not customers' equipment or with the line between the customer and BBN. Those are your problems.—*Carol Levin*

PC Magazine Online Events



WWW.PCMAG.COM. From November 4 to 8, join us on the Web for a discussion of Internet service providers, and talk to PC Magazine Online senior technical editor John Clyman for the inside scoop on the latest software for creating Web pages.

PC MAGNET. From this online service of ZD Net available through CompuServe (GO PCMAGNET), you can download utilities (GO TIPS) and join in discussions about new products (GO EDITOR). **First Looks Plus:** From November 11 to 15, discuss Eudora 3.0 with our First Looks staff and industry representatives.—*Tin Albano*

By Jake Kirchner

You Don't Bring a Knife to a Gunfight

Competition is an interesting concept. There are no rules in a fistfight, but there are international accords on the conduct of war. In the computer business, we all readily agree that market competition is a good thing. But we also agree that some competitive actions are inappropriate, even unfair. Drawing the boundary between fair and unfair competition is a real challenge—as Microsoft and its competitors have repeatedly found.

As customers, we're more concerned with the outcome of competition rather than its fairness. To us, the best computer industry competition provides two benefits: It gives us a variety of products from which to choose, and it spurs further advances in technology. The two benefits are interrelated. The more vendors in a market, the greater the incentive for them to keep improving their technologies, which in turn produces a greater variety of products, often at lower prices.

But even beneficial competition can get out of whack. The PC and Mac head-to-head used to be good for all consumers. It gave us real choices and drove technology. But with the ascendancy of the Windows/Intel "standard," the Mac has lost most of its ability to drive the market. We still have choices, but the competition is ineffective.

Compare that situation with the current competition in microprocessors. There's no question that a battle between Intel and its main competitors—AMD, Cyrix, and the PowerPC consortium—continues to accelerate the development of new technologies, new products, and price cuts, even though Intel has, by far, the lion's share of the market. That competition is very effective.



In spite of all the noise, it's hard to see where the real competition against Microsoft will come from.

In the Internet arena, the situation is less clear. Most analysts focus on "the browser battle" that pits Microsoft Internet Explorer against Netscape Navigator. The technology is leaping ahead, and the prices can't get much lower. But the two companies have driven out most of the other competitors, leaving us with fewer products from which to choose. So it's hard to rate this competition. Is it a real battle, or is it a rear-guard action on the part of Microsoft while it moves its army ahead for the important confrontations?

Unfortunately, much of the Internet-related competition is of the "We're not Microsoft" variety, typified by the ill-fated Kaleida venture between Apple and IBM. Kaleida shut down a year ago, leaving some interesting technologies but without achieving its goals. There's a certain Kaleida-like tinge to the recent Internet initiatives involving various combinations of Apple, IBM, Netscape, and Sun.

Each company brings some strong technology or ability to these projects, such as Sun's Java programming language, Netscape's SuiteSpot Internet servers, Apple's QuickTime multimedia technology, and IBM's support of the OpenDoc object model. But when asked

about the benefits of these efforts, the companies too often fall back on the weak statement that the technologies "will help us compete with Microsoft." That's fine, but how effective will their "Anybody but Microsoft" banner be in rallying computer users to their side?

Despite the vendors' noise, it's hard to see where the real competition against Microsoft will come from. There are just too many knives in this gunfight. Fair or not, today, Microsoft still has all the guns.

The New U.S. Encryption Policy

The latest rules are a step in the right direction.



In an effort to end the standstill between intelligence agencies and the computer industry over data encryption policy, industry bigwigs—including Cylink, Digital Equipment Corp., IBM, and RSA Data Security—are

backing the government's proposal to ease export restrictions and to implement a system known as the Key Recovery Initiative.

While the computer industry generally agrees that the new policy addresses some of the vulnerabilities of the government's past proposals and is a positive step, some privacy advocates and computer industry representatives say the system neither goes far enough to ensure competition abroad nor limits the potential for governmental abuse.

Under the new plan, the government increases the size of exportable cryptography keys from 40 bits to 56 bits for a period of

two years, provided that companies give the government a way to access the encrypted messages. All key-size restrictions end after two years if a legitimate method of "key recovery" is provided. If a company fails to deliver, it must once again adhere to a 40-bit-code restriction.

About a year ago, IBM proposed a "key system," whereby the company gives the keys to decipher encrypted message headers to two independent parties as well as to a law enforcement agency upon receipt of a search warrant. A law enforcement agency could then unscramble the header but would be responsible for mathematically decoding the rest of the encrypted information.

This approach eliminates one of the main criticisms of the govern-

ment's previous plan, called Clipper—a "key escrow" system that required a company to hand over to the government or to a private entity a software key to unlock encrypted information. The computer industry criticized Clipper for compromising computer users' privacy rights as well as hindering the competitive opportunities for U.S. software companies abroad.

The new policy allows industry, not government, to develop the actual key recovery system, an approach that ensures greater privacy. But RSA Data Security says the proposal "does little to enhance the competitiveness of American products overseas," since companies outside the U.S. can sell encryption products that don't require any key recovery system at all.—Angela Hickman

The only time it slows down
is to take important calls.

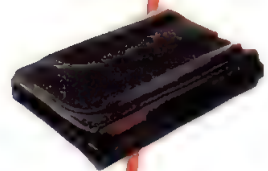
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U.S. Robotics

First Looks

HANDS-ON REVIEWS OF NEW SHIPPING PRODUCTS

WEB AUTHORIZING

Web Page Improvement

Home-page editors for all sorts of users.—By John Clyman



Building and maintaining a Web site is a lot like fixing up a home: You need the right tools to do a good job. Only a few years ago, most Web authoring was a job that required a lot of manual labor, an intimate knowledge of HTML coding, and no small degree of patience. A new generation of graphical-based editors is changing that and making it possible for just about anyone to design and publish sophisticated pages. Think of these WYSIWYG editors as power tools for Web authors.

Since we last reviewed them ("Web Authoring," September 10, 1996), nearly half a dozen new products have hit the market. They run the gamut from packages targeted at novices to industrial-strength programs for Webmasters. All of them disguise the details of HTML coding behind a variety of WYSIWYG interfaces.

For diehard HTML jocks who want total control over their documents, there are several code-based tools such as SmartDesk's WebEdit Professional 2.0. But for the bulk of users who simply want to develop a professional-looking Web presence with a minimum of hassle, WYSIWYG is the way to go today.

WHO'S IN, WHO'S NOT

For this roundup, we looked at six shipping products: Asymetrix WebPublisher, Claris Home Page, Microsoft FrontPage 1.1., MySoftware's MyInternetBusinessPage, NetObjects Fusion, and Net-

scape Navigator Gold 3.0. In addition, we previewed the beta version of Microsoft FrontPage 97, the successor to the Editors' Choice-winning Version 1.1. Unfortunately, Adobe's PageMill is still available only for Macintosh; expect a PC version by year's end.

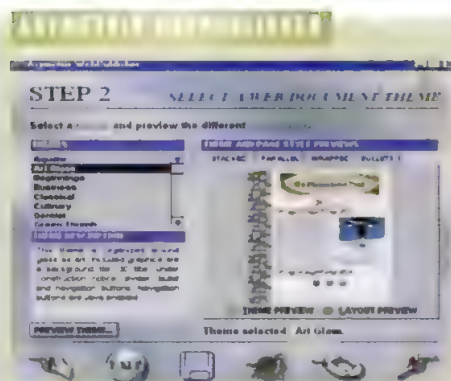
From a practical point of view, these Web tools insulate you from many of the gritty details. Typically, you begin by defining the pages that will appear on your site. Often you can choose a prebuilt design from a set of templates, fill in the contents, and format the text and graphics. When you're finished building the pages, you publish them to a server.

DIFFERENT HTML STROKES

Within these general confines, however, there is a great deal of variation among the products depending upon their intended audiences. WebPublisher, for instance, bucks the document-centric trend of Web authoring tools by using a sequence of simple page-creation dialog boxes, but it has trouble with sites of more than a few pages. NetObjects Fusion, which takes its cue from desktop publishing applications, is powerful and flexible but can't generate pages that employ HTML frames. FrontPage includes server-side software, but it can't work directly with HTML code. Home Page provides a comfortable middle ground in terms of capabilities, but it can't directly change the width of columns within tables,

which can be frustrating if you rely on tables to position page elements. MyInternetBusinessPage is simplistic in the extreme, but it offers a unique degree of integration with a hosting service.

The good news is that no matter what level of experience you have or what type of Web site you plan to build, there's a Web editor for you.



READY-MADE: WebPublisher lets you choose from a number of design themes.

Street price: \$80.
Requires: 8MB RAM,
16MB hard disk space,
Microsoft Windows 95
or Windows NT

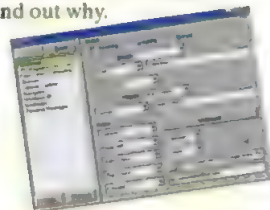
Asymetrix Corp., Bellevue, WA
800-448-6543, 206-462-0501
www.asymetrix.com

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INSIDE

EUDORA PRO 3.0: Fast becoming the Internet's e-mail standard. See page 69 to find out why.



FINAL EFFECTS AP 1.0:

Because you can never have too many transition effects in your video editing toolkit. See page 52 for the full review.



DELL POWER-EDGE:

A server delivers Pentium Pro technology on a budget. The review starts on page 48.



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First Looks Online

From Nov. 4 to 8, go
Online to Discuss
WEB Authoring Tools.
WWW.PCMAG.COM



First Looks

Asymetrix Corp. Asymetrix WebPublisher

The \$80 WebPublisher package from Asymetrix Corp. (which is partially owned by Softbank Corp., the parent company of *PC Magazine's* publisher) makes creating a Web site so elementary that even a novice can do it. The trade-off for this simplicity, though, is that WebPublisher offers little design flexibility.

WebPublisher is not a traditional application as much as a series of wizard-like dialog boxes that take you through the Web-publishing process. Choose a single-page or multi-page design, select a design theme, and you're halfway there. All that's left is to fill in the details: type in text, drop in graphics, and add links where necessary. Preview the results in your favorite browser—as long as it's not Microsoft's Internet Explorer, which is not supported by WebPublisher. When you are finished, you can bundle all the files together to transfer them to your Web server via FTP.

WebPublisher automatically sets up buttons, so users can navigate your site. For some design themes, the buttons are Java-enabled and appear to depress when clicked; other themes include animated .GIFs. WebPublisher can also add such touches such as 3-D title text and mailto: links for sending e-mail.

One of the constraints of WebPublisher is that you can insert only a single graphical element and a single text block (or a set of bulleted items) per page. Text markup options are limited to boldface, italics, small and large fonts, and left/right/center justifi-

cation. It was possible, however, to inject some additional text formatting by importing an .RTF file from a word processor.

To its credit, WebPublisher includes a spell-checker, and it allows you to link text or graphics to other pages in your site or to external URLs. Page design is to some extent a matter of personal taste, but we found WebPublisher's design templates to be gaudy and poorly suited to business uses. Asymetrix posts additional templates on its Web site, however, and the company says that it will create new ones based on customer suggestions.

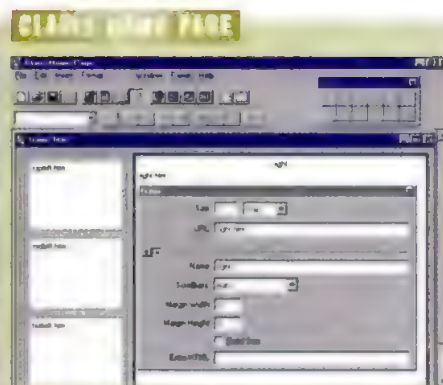
If your objective is to generate Web pages as expediently as possible, WebPublisher may merit a look. But in most cases you'll be better off with a more sophisticated and flexible product.

Clarix Corp.

Clarix Home Page

The \$100 Clarix Home Page is a solid and capable Web authoring tool that will meet most users' needs without cramping HTML aficionados.

Aside from FrontPage, Home Page is the only package we reviewed that can directly create and manipulate HTML frames. The program lets you edit HTML code directly within the program, supports HTML tables and forms, and includes an image-map editor. Despite its sophistication, Home Page occupies only 5MB of disk space, and that includes more than 500 clip-art images. When you launch Home Page, it opens



FRAME IT: Home Page has a remarkably simple system for setting up frames.

Street price: \$100.
Requires: 8MB RAM,
5MB hard disk space,
Microsoft Windows 95,
or Windows NT 3.51 or later
Clarix Corp., Santa Clara, CA
800-325-2747, 408-727-8227
www.clarix.com
Circle 433 on reader service card

an MDI (multiple-document interface) window with toolbars reminiscent of a word processor's. Within this window, you create and edit the documents that correspond to individual pages on your Web site.

Home Page lets you arrange text and graphics in any order you like; shuffling their position is a simple drag-and-drop operation. You can import text, or even drag in images or links from Windows Explorer.

The program automatically converts .BMP images to the browser-friendly .GIF format, and it can interlace images to make downloading seem faster. In case you find yourself frequently reusing the same graphics or the same text (banners or toolbars, for example), Home Page provides a drag-and-drop Library palette.

Text formatting is accomplished via toolbar buttons or pull-down menu options. To control image presentation, hot links, and the like, you make changes in the floating Object Editor box. The Object Editor includes a field where you can

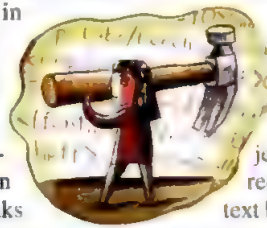
insert extra HTML for those codes that are not directly supported by Home Page. Although Home Page's native HTML support is relatively up-to-date, this backdoor approach means you can include the latest HTML tags manually.

Home Page's polished frames editor stands out. Home Page also supports HTML forms objects; creating a form requires dropping the text boxes, radio buttons, and command buttons into the HTML editor window. And the package provides an image-map editor that lets you define hot spots within a graphic and make a particular color appear transparent. Finally, Home Page includes an offer for a free trial period of site hosting on HoloNet, an Internet service provider.

On the other hand, Home Page won't let you change the width of individual table columns in the WYSIWYG editor, making the program difficult to use for pages that employ tables to position other elements. We found that the program's preview-in-browser feature helps here, but that requires an extra step.

Home Page also has a few minor interface quirks. Some traditional Windows shortcut keys don't work, and we were disappointed that no spell-checker was included.

On the whole, Home Page is a capable tool that offers a good mix of simplicity, power, and flexibility.



Side by Side: Web Authoring Software						
	Asymetrix WebPublisher	Clarix Home Page	Microsoft FrontPage 1.1	MyInternet BusinessPage	NetObjects Fusion	Netscape Navigator Gold 3.0
Yellow type denotes Editors' Choice.						
HTML source-code editing	✓	✓	✗	✓	✓	✗
Wizards/Templates	✓✓	✗✗	✓✓	✓✓	✗✓	✓✓
Table/Frames editor	✗✗	✓✓	✓✓	✗✗	✗✗	✓✓
Image map/forms editor	✗✗	✓✓	✗✓	✗✓	✓✓	✗✗
Java/ActiveX support	✓✗	✗✗	✗✗	✗✗	✓✓	✓✗

First Looks

Microsoft Corp.

Microsoft FrontPage

FrontPage, from Microsoft, is a program in transition. During our testing, Version 1.1 was shipping, and it remains one of the premiere HTML authoring tools available. But its successor, FrontPage 97, is now publicly available in a beta release on Microsoft's Web site, and it takes this classic Web editor a step further.

FrontPage 1.1 (\$149) wins kudos not just for providing an impressive WYSIWYG Web page editor and visual Web design tool, but for offering an amazing array of site maintenance and server-side features as well. FrontPage lets you design sites with server-supported capabilities for processing forms or hosting threaded discussions. It is the only product of the six that includes a personal Web server, and FrontPage also has a number of WebBots, which perform such functions as time stamping.

Creating a new site starts with one of the FrontPage Explorer's wizards, which creates a skeleton site. You choose the type of pages you want and the site's design theme. Explorer shows both a link view and a tree view of your site. Switch to the FrontPage Editor and you can edit the contents of individual pages.

FrontPage also has a unique To Do list feature that helps keep track of tasks that still need to be done. The program supports forms, tables, and frames, and it is one of the few products that does a good job of importing existing

Editors' Choice

• NetObjects Fusion



The Web authoring category has evolved quickly to include a

broad range of products designed for varying audiences.

Nevertheless, one product stood out for its innovative approach to HTML authoring and comprehensive support for HTML extensions, plug-ins, and components. A newcomer to the Web authoring scene, NetObjects Fusion is our Editors' Choice among the shipping products we reviewed.

Fusion adopts a desktop publishing-like interface. All you do is put the page elements where you want them to appear and Fusion's engine automatically generates the requisite HTML coding. Even more impressive is its ability to update toolbars and other elements as you drag and drop new pages onto your site.

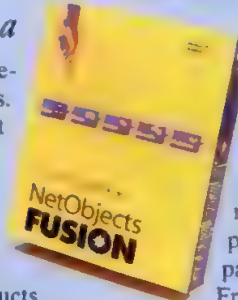
Fusion's ready-made sites make deploying

corporate intranet or Internet sites less taxing, and for more advanced sites, Fusion supports audio and video clips, and Java and ActiveX components. Finally, a sophisticated data-publishing feature makes short work of integrating database and spreadsheet files into Web pages. At \$500, Fusion is the most expensive package in this group, but we believe its

intuitive interface and powerful features make it well worth the price.

Microsoft FrontPage 1.1, the Editors' Choice recipient in our September 10, 1996, roundup ("Web Authoring"), remains a very impressive package, but one that has been passed by in some regards. FrontPage has a solid WYSIWYG editor and site-builder tool.

What really sets it apart, however, is tight server integration, which makes it possible to set up server-hosted capabilities—such as threaded discussions—with ease. We're looking forward to the release of FrontPage 97, which will extend FrontPage's capabilities even further with such features as live database connectivity, ActiveX support, and the ability to edit source code.



HTML pages. Comment tags and unrecognized tags are indicated by <!> and <?> icons, respectively.

Beginning with this impressive foundation, FrontPage 97, which should be released in final form by late fall, adds support for the latest HTML extensions, plug-ins, and components. FrontPage 97 also includes support for ActiveX components, Java, and Netscape

plug-ins. Among the HTML extensions, that FrontPage 97 now supports is the Font Face tag.

The package's Script Wizard makes JavaScript and VBScript easier to handle. We were able to write scripts by pointing to visual representations of objects and events. This is a vast improvement over current packages that require you to type raw code in a dialog box.

FrontPage 97 is aiming to leap-frog over NetObjects' static data-publishing support by adding live server-to-database connectivity, which allows users to query ODBC databases. FrontPage 97 can perform find-and-replace operations and check spelling, and the program integrates Office 97's thesaurus.

A big step forward from Version 1.1 is

FrontPage 97's ability to edit HTML code directly. The fairly sophisticated HTML editor color-codes HTML tags. A new Import wizard helps you to migrate existing Web sites into FrontPage 97. Also included in FrontPage 97 is Microsoft Image Composer, a powerful image editor acquired from Altamira Software.

Setting a new standard for Web authoring tools, FrontPage 97 picks up where FrontPage 1.1 leaves off.

MySoftware Co.

MyInternet-BusinessPage

MySoftware's \$119.95 MyInternetBusinessPage takes a soup-to-nuts approach to Web building that will appeal to business owners who have neither the time to master HTML nor the budget to contract out Web site design. The package's inadequate Web tools are partially compensated for by its superior integration with a hosting service.

BusinessPage falls far behind

List price: \$149.

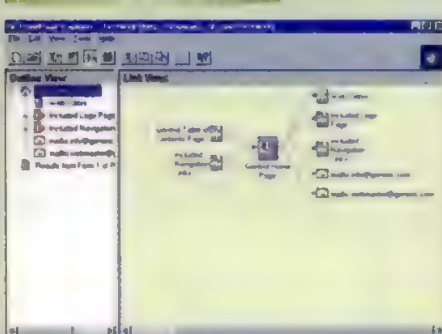
Requires: 16MB RAM, 15MB hard disk space, Microsoft Windows 95, or Windows NT 3.51 or later

Microsoft Corp., Redmond, WA
800-426-9400

www.microsoft.com

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Microsoft FrontPage



NO LOST LINKS: FrontPage Explorer shows links and a tree view of your site.

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The 100 MHz Intel Pentium® Processor equipped TravelPro 180 comes fully-loaded with 8MB of fast EDO RAM, 800MB of IDE storage, and features the Intel 430MX chipset for super-charged performance.

Sporting a crisp and clear 11.3" SVGA dual scan display, the TravelPro 180 offers a maximum resolution of 1280 x 1024, up to 16.7 million dazzling colors, and 128-bit NeoMagic video acceleration for smoother, more stable graphic images.

Other standard features include 16-bit stereo sound, a lithium ion battery, programmable trackpad, PC Card Type III expansion, room for an optional 6X internal CD-ROM and- as if that isn't enough- it's all backed by a three-year warranty on parts and labor.

Did we mention price? Let's face it. At under \$2,000, you'd have to travel far and wide to find a notebook computer that can match the beauty and the brawn of the new TravelPro 180.



So why wait? For more information about the TravelPro 180 visit the AMS Tech website at <http://www.amstech.com> or try our faxback service at 1-800-886-2671.

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First Looks

the curve in its HTML support. It supports neither tables nor frames, and it can't even work with the full complement of HTML 2.0 features. For example, to increase or decrease the font size, you have to designate an entire text block as an HTML header. This can cause such undesirable side effects as the insertion of blank spaces above and below the text. You can change text colors but only for the entire document. And you can center paragraphs, but you can't right-justify them.

In addition, the program has no facility for manually inserting HTML tags, and if you try to import an HTML page with unrecognized tags, they're simply converted to text. BusinessPage also suffers from a clunky and unsophisticated interface, although it does include a find-and-replace capability and a spell-checker.

The program comes with Netscape Navigator and a sub-

scription to the EarthLink Network service provider (\$25 setup fee; \$19.95 per month for unlimited use). The package's links to the SwiftSite Web site hosting service go deeper. You can simply upload them to a SwiftSite server, which will host them free for 12 hours. For a more permanent presence, you choose a pricing plan and fill out a subscription form.

While a number of packages let you lay out HTML forms, most offer no assistance with the hardest part: getting your Web server to collect and collate the results. SwiftSite, however, is set up so that responses are e-mailed to you automatically—a nice touch.

Although its all-in-one approach to authoring and publishing and its strong forms support are welcome features for novices, MyInternetBusinessPage's limited editing abilities make it a one-trick Internet pony.



MY FIRST SITE: Test out your site with BusinessPage's free trial period on SwiftSite.

List price: \$119.95.
Requires: 8MB RAM,
8MB hard disk space,
Microsoft Windows 3.1
or Windows 95
MySoftware Co., Palo Alto, CA
800-325-3508 415-473-3600
www.mysoftware.com
Circle 435 on reader service card

NetObjects Inc.

NetObjects Fusion



NetObjects Fusion combines a best-of-breed WYSIWYG design environment with impressive database-import tools, resulting in a package that can produce rich, professional Web sites in record time. At \$500, Fusion is more expensive than any other package in this roundup, but Web authors who seek high-precision, desktop-publishing-style layout

capabilities for rapid site development will find no parallel.

To create a page, you select a single-page template, a multipage AutoSite template, or an entirely blank site. AutoSites aren't just predesigned layouts; they're complete templates for human-resources, marketing, and other types of sites, and each contains dozens of pages with text and image placeholders.

To add pages, you press the Insert key; reorganizing sections is a drag-and-drop operation. You can zoom in and out, collapse levels of the hierarchy, or switch to a Win-

Tapping into the Wisdom of the Web

New software tools are making it easier than ever to create and publish Web documents, but the Web itself is playing a role as a virtual HTML classroom.

Microsoft and Netscape have each crammed their sites with loads of information about Web authoring and design. Microsoft has the edge with its slick Site Builder Workshop (www.microsoft.com/workshop). The authoring/editing section features HTML how-to guides, FAQs, mailing lists, stylesheets, conversion tools (such as the rudimentary Internet Assistants), and developer software. The new Web Gallery has a library of images, sounds, stylesheets, ActiveX components, and TrueType fonts you can download.

Netscape's site (home.netscape.com) isn't as sophisticated, but it features a Page Starter Site, Page Wizard, and Web page templates. You can find information on using frames and creating high-impact Web documents, as well as more technical documentation and white papers.

But the vast majority of helping hands reside outside the reach of the Big Two. Here are a few favorites:

- A good place to start is the National Center for Supercomputing Applications' Beginner's Guide to HTML, a quick, no-nonsense tutorial on the fundamentals (www.ncsa.uiuc.edu).

GREAT BALLS OF FEATURES: Microsoft's Web site includes a variety of Internet-related resources.



- The World Wide Web Consortium (www.w3.org), an industry group that serves as the Web's standards-setter and watchdog, is great for keeping up with rapidly evolving HTML specifications.
- Sandia National Laboratories maintains a comprehensive HTML reference guide (www.sandia.gov/sci_compute/html_ref.html) that should be on every Webmaster's bookmark list.
- The HTML Reference Windows Help file can be downloaded from Microsoft's Web site (www.microsoft.com/workshop).
- Once you've mastered the basics, check out Composing Good HTML (www.cs.cmu.edu/~tilt/cgh), by Eric Tilton.
- For the true Web addict, [webreference.com](http://www.webreference.com) (www.webreference.com) has it all: news and features, Internet statistics, FAQs, tutorials, and even job listings.

When you think you're done, try your Web creation at one of the many validation services. Some of the better ones we've looked at include Webtechs (www.webtechs.com), Weblint (www.khoros.unm.edu/staff/neilb) and Doctor HTML (imageware.com/rxhtml.cgi).

—John Morris

First Looks

dows Explorer-style collapsible tree view of your site. You can also color-code pages and flag them to indicate their status.

After you've laid out the site's structure, switch to Fusion's Page view to prepare the individual pages. The Style view allows you to apply background patterns, text and link colors, bulleted lists, and textures for the navigational toolbars to any page.

Unlike most Web authoring tools, which emulate word processors, Fusion is more akin to a desktop publisher. You position elements where you want them on a page and Fusion's engine generates the tables and other HTML code snippets required.

Each page can be associated with headers and footers, which can contain banners, navigational toolbars, or other recurring elements. After you define page relationships (child, sibling, or parent) in the Site view, Fusion automatically generates many of these elements. The program even includes a .GIF composition capability that automatically overlays text onto banners and .GIF buttons in any font. As a result, we were able to specify a generic banner for every page on our site, but vary the text within the banner on each page without having to create dozens of individual graphics manually.

At any time you can preview a single page or your complete site in a browser to ensure that it looks the way you want it to. Of course,

Fusion lets you manipulate text and image properties and insert hot links manually.

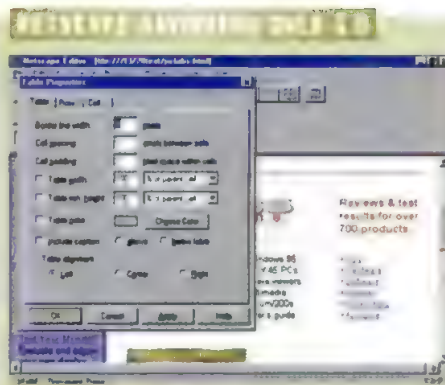
Fusion pages can include audio and video clips, plus ActiveX, Java, and Shockwave components, and a number of useful components are provided. You can also insert your own HTML or script-based code.

The only significant omission from Fusion—and it's a big one—is the lack of support for HTML frames.

One of Fusion's most potentially powerful features is its support for data publishing. By inserting a Data Table object into a page, you can import a database into your site and Fusion generates not just a tabular overview of the database but individual detail pages for every item. For instance, we used this feature to load a company phone list and have each employee's name linked to a details page showing title, location, and so forth.

The program supports a variety of native database and spreadsheet file formats plus ODBC. One shortcoming of the data tables is that you can't apply numerical formats to individual fields before publishing the data.

As you put the finishing touches on your site, Fusion's Assets view provides an excellent overview. Finally, the Publish view lets you stage your site for testing on a Web



SETTING THE TABLE: Navigator Gold's new tables editor makes setting up tables a breeze.

Street price: \$80.
Requires: 4MB RAM,
6MB hard disk space,
Microsoft Windows 3.x,
Windows 95,
or Windows NT
Netscape Communications Corp
Mountain View, CA, 415-937-2555
home.netscape.com
Circle 437 on reader service card

server or upload it to a live server. The Publish view also offers options for creating alternate versions of the site automatically to support low-bandwidth connections or text-only browsers.

NetObjects Fusion forges a new path among Web authoring tools with its sophisticated, flexible, and intuitive method for rapidly building a variety of Web sites.

Netscape Communications Corp. Netscape Navigator Gold 3.0

Netscape Navigator Gold 3.0 takes the familiar, Editors' Choice-winning Netscape Navigator 3.0 browser and transforms it from a passive viewer to an active, WYSIWYG Web page editor ("Browsers at the Crossroads," October 22, 1996). It lacks support for creating forms and frames, but the \$80 Navigator Gold provides seamless integration into a familiar browser interface.

To switch the browser to editing mode, you click on the pencil icon on the toolbar. This causes Navigator Gold to download the page and its graphics for you to modify. You can also begin with a blank page or build a starter page with the templates and wizards on Netscape's site.

Inserting or modifying text and graphics is done by typing in a word processor and selecting options from the toolbar or from pull-down

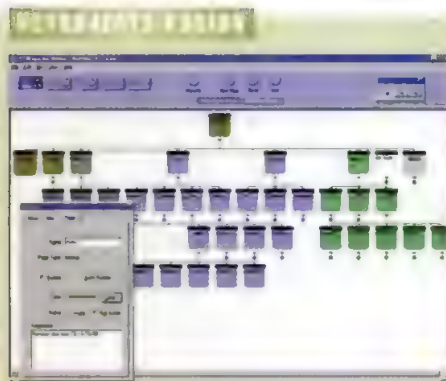
menus. Setting such attributes as text wraparound images requires a right-mouse click and either making a few selections in a basic dialog box or using the menu. Adding links is similarly straight-forward.

Navigator Gold lets you insert and edit HTML tables—a feature new to Version 3.0. The table-formatting options are extensive and logically presented. The results appear in the editor window and closely resemble what will appear in the browser.

Navigator Gold is a step behind the company's flagship browser in terms of HTML support. For example, you can't create forms or frame sets. And you can't change typefaces, even though the browser correctly reads the Font Face tag that performs this task. The program does, however, let you insert supplemental HTML tags by hand.

When you're finished building your Web pages, Navigator Gold can publish them to your server. Enter the server name and your user name and password in the Editor Preferences dialog box, click on a toolbar button and the program automatically uploads all the necessary files.

Netscape Navigator Gold 3.0 lacks such amenities as a spell-checker, image-map editor, and full support for drag-and-drop operations. But the program's excellent integration with the Navigator browser plus its strong support for most HTML tags make it a particularly easy-to-use if not especially powerful program.



SITE SEEING: NetObjects Fusion lets you drag and drop new pages to organize your site.

Street price: \$500.
Requires: 16 MB RAM,
50MB hard disk space,
Microsoft Windows 95,
or Windows NT 3.51 or later
NetObjects Inc., Redwood City, CA
888-449-6400, 415-943-4048
www.netobjects.com
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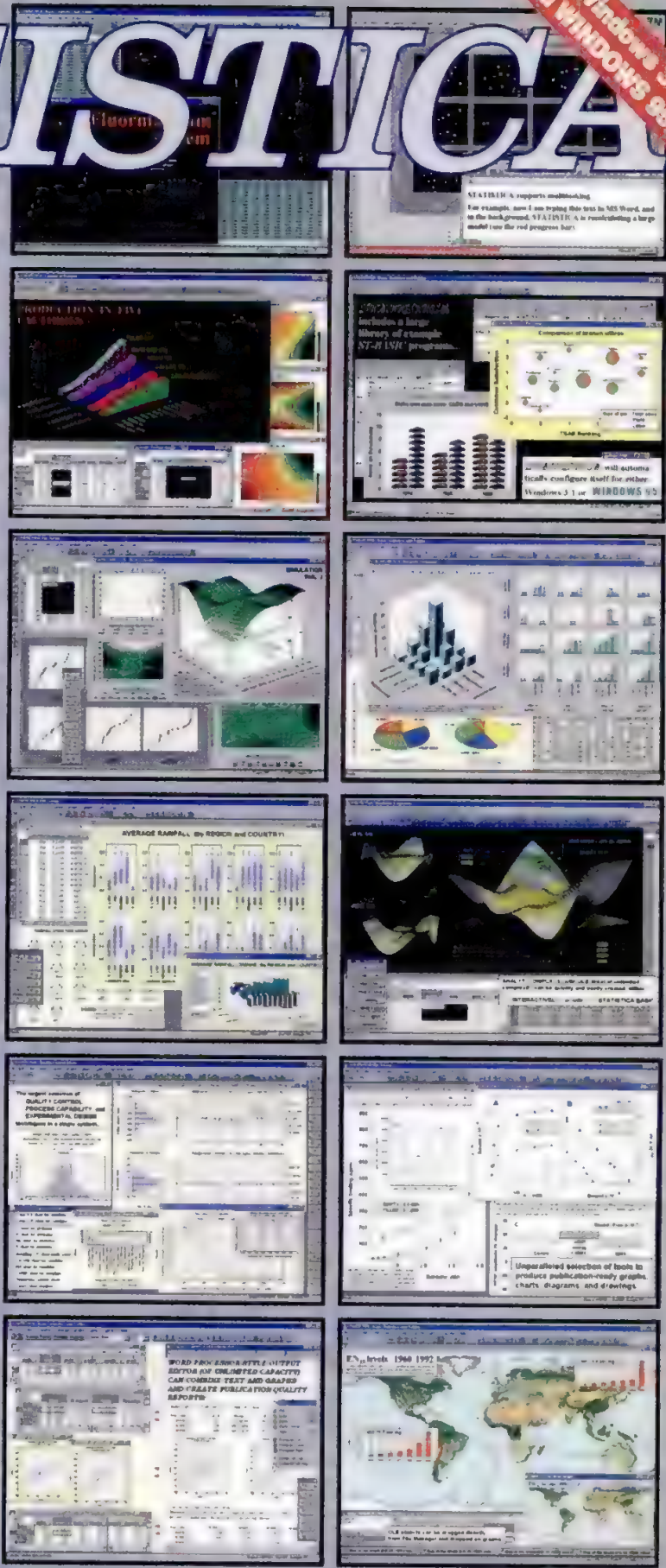


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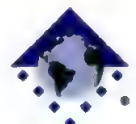
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Pentium Pro Goes Economy

The Dell PowerEdge 2100 is one Pentium Pro server that places price above all other considerations.—By Steve Buehler

Dell's new PowerEdge 2100 server breaks new ground in terms of server definitions by making its price paramount. This \$7,837 200-MHz Pentium Pro server balances an aggressive price tag with a few redundancy and fault-tolerant features and very good performance.

Housed in a handsome desktop mini-tower case, the PowerEdge comes packed with high-quality components. The single-Pentium Pro machine we tested came with 256K of external cache, 128MB of EDO RAM (it can hold up to 256MB) of EDO, and an 8X CD-ROM drive. Dell offers either 4GB or 9GB Fast SCSI-2 disks for this system, and there is room for four other disks: three in the drive case and another in the front bay.

An Adaptec AIC-7880 chip set supports the PowerEdge 2100's Ultra SCSI, motherboard-based host. The three EISA/ISA slots don't intrude on the motherboard's three PCI slots.

The PowerEdge has neither hot-swappable power supplies nor an upgradable motherboard that will support a faster CPU or an additional processor for symmetric multiprocessing (SMP). The system's single-channel SCSI host on the motherboard means disk mirroring or duplexing requires some effort. For those who find this scenario confining, Dell has introduced a high-end PowerEdge 4100 line, which adds SMP, ECC memory, more memory support, a larger case, and some hot-swappable components.

We tested the PowerEdge as an application server. We compared our results with a reference 133-MHz Pentium system in both single and dual configurations using the ZD ServerBench 3.0 benchmark test on a 60-client LAN. As we expected, the PowerEdge easily outperformed the single Pentium system by about 50 percent across a



THE POWEREDGE 2100 offers solid performance at a ground-breaking price.

high-end server features led us to question its market niche. The system provides only four drive bays and limited accessory card support. While the system's CPU can't be upgraded, it is easy to open the case and perform most routine maintenance.

Compared with other Pentium Pro servers, the PowerEdge is inexpensive. But Dell goes a step further than the others by including Intel's LAN-Desk Server Management Suite, which is normally found on more serious—and more expensive—corporate servers.

If you're looking for an inexpensive server to launch your departmental intranet, the PowerEdge could be a worthy contender. The good performance and low price will be attractive to network administrators more concerned with the bottom line than with fault tolerance.

In environments that can't tolerate any down time, the competition for the PowerEdge comes from such systems as the Hewlett-Packard LH Pro line, which have hot-swappable disks, redundant power supplies and fans, the ability to add a second CPU, and more slots for greater expandability, but whose price tag is over \$20,000.

Balancing that power against the price of the less expensive machine may be a tough choice, but thanks to the Dell PowerEdge 2100, it's nice to know you have the option.

PowerEdge 2100. List price: With Pentium Pro/200, 256K external cache, 128MB RAM, three 4GB hard disks, 8X CD-ROM drive, and two Intel 10/100 network interface cards, \$7,837. Dell Computer Corp., Austin, TX; 800-289-3355, 512-338-4400; www.dell.com. Circle 406 on reader service card.

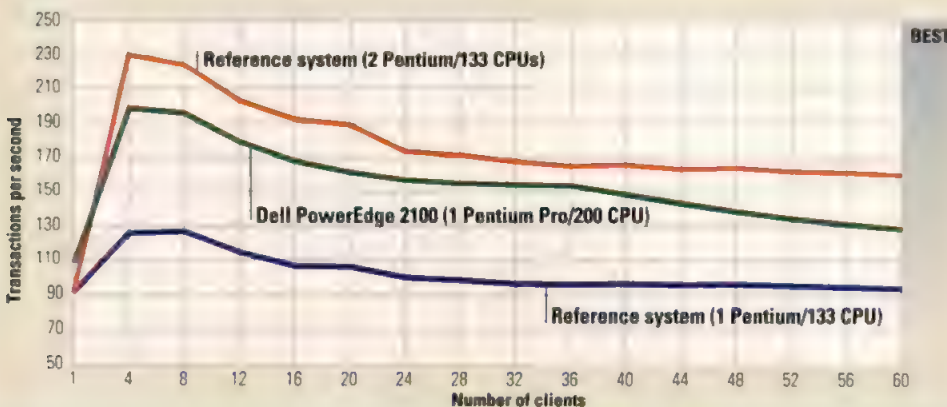
BENCHMARK TESTS

Pentium Pro Servers

The Dell PowerEdge 2100, with one Pentium Pro/200 CPU, easily outperformed a 133-MHz Pentium system on our tests. The PowerEdge achieved about 90 percent of the throughput of a dual-CPU Pentium system, but it lagged

slightly behind at higher client loads.

To measure performance, we used ZD ServerBench, Version 3.0. Each system was equipped with 128MB of RAM, ran Microsoft Windows NT 3.51, and was tested on a 60-client LAN.



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NETWORK ADMINISTRATION

A Bodyguard for CDs

MediaAgent is a powerful utility that keeps an eye on your CD-ROMs across the network.—By Steve Rigney

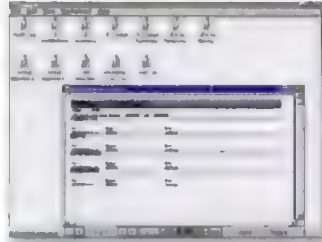
If you're like most network administrators or end users, you probably have dozens—if not hundreds—of CDs stacked around your office. With nearly all vendors now shipping software on CD-ROM, the CD deluge is only going to get worse. But CDs are assets and you should keep track of them. That's where MediaPath's MediaAgent for CDs, Version 1.0 comes in.

MediaAgent allows you to keep track of all of the CDs on a network. Whether they reside on a CD-ROM drive on the server, in a jukebox, or in a client PC, MediaAgent can tell you where your CDs are, if they're in use, and who's using them. You can even tell if a CD has been moved from one location to another. The program costs \$495 for a 10-user license, but if it helps you find one lost CD, the price may be worth it.

One of the most powerful features of MediaAgent is its client software agent, which runs on any Microsoft Windows-based PC and across any network operating system. The client communicates with the MediaAgent database, providing information on the type of CD-ROM drive in use, the CD in the drive, and the CD title. Even if the CD is on a client PC that is not a network server, the client software can track it.

The client software is easy to use and provides quick access to any CD from the My Computer folder. All the available network CDs are presented to the user as icons or folders. The user doesn't have to know where the CD resides or even how to start the application. When a user selects a CD, MediaAgent finds the CD and starts the application. If it can't find the CD, it sends an alert to the last person who accessed it and notifies the searching user that the CD has been removed. You can also customize

the messages you send to MediaAgent users. For example, we sent a message to the last user of a missing CD requesting that the CD be inserted into the server.

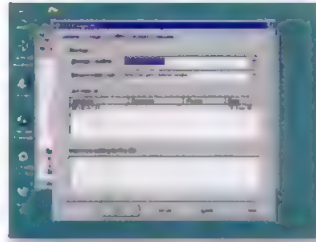


PLAY USE: We were impressed with MediaAgent's reporting capabilities. You can track CD usage, users, member lists, and any errors.

The MediaAgent administrator allows you to control such features as security and to categorize your CDs. On our tests, we created several users and groups, and we were able to define access to certain CD titles based on user name and password. You can also

define access based on the groups that a particular user belongs to. This is a valuable feature for those who have hundreds of users and CDs. You can also limit the number of users who can access a CD simultaneously.

This access information is stored in the MediaAgent c-tree database. In addition to keeping track of CD titles, the database keeps an audit log you can view and use to print reports. The abil-



DISCOGRAPHY: MediaAgent keeps track of a CD's location, who used it last, and what actions take place when you launch it.

ity to print reports based on usage, group membership, users, CD inventory, and the audit log is impressive. You can determine when a CD was accessed, how many times, and by whom.

Another powerful feature of MediaAgent is its load-balancing

utility. When a user tries to access a popular CD title, MediaAgent determines how many users are currently accessing the CD and looks to see if a copy is available on another server.

MediaAgent can define the speed of the CD-ROM where the CD resides, so you can get the best performance. If all CDs are in use, MediaAgent uses a preset optimum setting to decide if and where you can access the application.

MediaAgent is designed to keep track of all of your CDs and CD-ROMs, not to share CDs on a network. As more software appears on CDs and more people start using CD-recordables to make their own CDs, MediaAgent will become a necessary tool in every network administrator's arsenal.

MediaAgent for CDs, Version 1.0. List price: For 10 users, \$495. Requires: 7MB RAM on client, 20MB hard disk space on host PC, Microsoft Windows 3.x, Windows 95, or Windows NT 3.51 or later. MediaPath Technologies Inc., Mt. Laurel, NJ; 800-357-0697; fax, 609-222-0552 www.mediapathtech.com. Circle 420 on reader service card.

CD-ROM Jukebox Without the Jive

Most network CD-ROM jukeboxes cost thousands of dollars, weigh more than most network administrators, and take up loads of floor room in wiring closets. Smart and Friendly (www.smartandfriendly.com) has set out to prove that that doesn't have to be the case. The Smart and Friendly CDJ 4008 CD-ROM jukebox retails for only \$599, has an internal 8X CD-ROM drive, holds as many as four CDs, and includes CD-ROM network and standalone software that would cost over a \$1,000 if purchased separately.

The CDJ 4008 is housed in a chassis about the size of an external CD-ROM drive. The bundled software can map all the CDs to one drive letter, or you can assign a letter to each CD in the unit. The package also comes with all the hardware you need to get started right away, including an

Adaptec SCSI-2 ISA adapter, SCSI cable, and even audio jacks. We were able to install the package within minutes.

Although you can use the bundled CD-Tools software to install the jukebox on a standalone PC, the unit also works on your network server. The kit includes MediaPath's MediaAgent (see

review above), as well as Ornetix's CD-Vision and CD-Commander.

These software packages allow you to use the CDJ 4008 to share and manage all your CDs on the network.

The CDJ 4008 is not powerful enough or large enough to

handle dozens of simultaneous users, but with a great price tag and flexible software, it's a good option for most workgroups.—SR



DIGITAL-VIDEO SOFTWARE

Instant Video Studio

MetaTools' Final Effects AP does for video special effects what Kai's Power Tools did for image editing.—By Luisa Simone

Final Effects AP 1.0 is the latest in a series of Adobe plug-in filters from MetaTools, with an important twist: Instead of meeting the Adobe PhotoShop plug-in specification for image editing, Final Effects was designed specifically to work with Adobe Premiere and compatible video-editing applications. This \$199 collection of a dozen filters and four transitions is the next generation of animatable video-editing tools and will be a valuable addition to any digital-video studio.

All of the Final Effects filters

screen, while FE Sphere controls ambient and specular light.

Final Effects can also be dynamically varied over time in a way that standard Premiere filters can't. This is because of the implementation of keyframes. While Premiere's filters allow you to set only the starting and ending values for effects—creating a linear change over time—Final Effects allows you to create any number of keyframes along a time line. The point is that each keyframe marker can represent a new value for any of the pro-

choose from any of three different interpolation modes: linear, ease in/ease out, and Bezier. This allows you to control whether the transitions between keyframes are uniform or smoothed.

The product really shines when generating effects based on geometry. For example, we used FE Ball Action to convert a digital image into a screen of artfully arranged balls, and then we exploded an image into a profusion of polygons with FE Pixel Poly. The bottom line is that truly professional-looking video results are now available to PC users. You will, however, need a high-end computer capable of handling the processing and data requirements.

Final Effect's showpiece filter, FE Particle Systems II, has been designed to generate particle effects such as fire, smoke, and explosions. You can, for example, combine any of 13 animation methods with 21 different particle

JUST SO: The Particle Effects module gives you a deep level of control over a variety of effects.

types. The controls found in this module give you the freedom to produce an astounding number of variations. The problem is that

the metaphors of natural phenomena employed in this dialog box, such as Birth Rate and Death Color, don't produce particles with a truly organic appearance. Overall, this filter fell short of our expectations.

When compared to Strata's MediaPaint 1.0 (First Looks, September 10, 1996), which specializes in natural effects that can be literally painted onto a source movie, Final Effects has two serious limitations. The particles themselves appear hard-edged and simplistic. And the ability to position the origin point on a preview window provides only minimal control over the path the particles travel.

We found that Final Effects produced the most naturalistic results when filters were specific rather than generic. As a result, the single-purpose filters, FE Rain

and FE Snow, generate realistic-looking precipitation because they start with irregularly shaped and fully anti-aliased particles.

This is just the start for MetaTools in the video arena. The company has announced Final Effects, an add-in for Adobe After Effects for Windows, a



PURE AS THE ...: Snow falling on a kaleidoscope world was generated using a simple text screen and FE Kaleida, FE Sphere, and FE Snow.

high-end video animation and compositing application.

On the premise that you can never have too many transition effects in your video editing toolkit, Final Effects AP also ships with FE Page Turn, FE Radial Scale Wipe, FE Scale Wipe, and FE Twister. These effects add ways to move from scene to scene that go much further than standard wipes and dissolves.

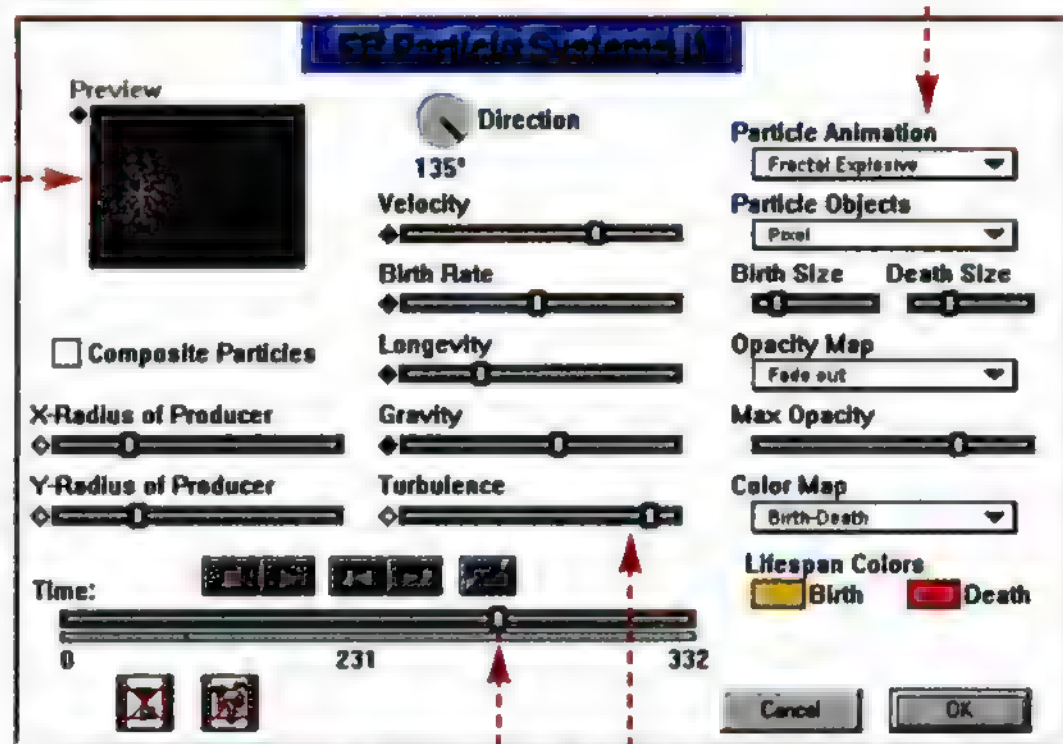
Surprisingly, this MetaTools product doesn't boast the playful and innovative interface of Kai's Power Tools or Kai's Power Goo. Instead, filters are controlled using traditional slider bars and drop-down menus. The result is a double-edged sword: This program is amazingly easy to use, but it lacks the intuitiveness of MetaTools' other interfaces.

Still anyone familiar with Premiere can produce a wide range of compelling effects within moments of loading Final Effects AP.

Final Effects AP 1.0. List price: \$199. Requires: 16MB RAM, 25MB hard disk space, Microsoft Windows 95 or Windows NT 3.51, application that supports the Adobe Premiere 4.2 Plug-in specification. MetaTools Inc., Carpinteria, CA; 800-472-9025; fax, 805-566-6385; www.metatools.com. Circle 405 on reader service card.

1 You can specify a new position for the origin point by moving the cross hair in the preview window.

2 The drop-down lists set up basic parameters, such as particle type and animation method.



3 The time line can contain any number of keyframes. Keyframes are indicated in the time line by a black line.

4 The slider controls allow you to influence the animation effect with natural phenomena, such as gravity.

share two features: user-defined parameters and the ability to employ keyframes. User-defined parameters allow you to control and customize special effects; the parameters themselves, of course, are specific to each effect. The FE Bubble filter lets you customize bubbles' size and how they move across the

program's animatable parameters, resulting in special effects that can change multiple times over the course of a single video clip.

In general, we give Final Effects AP high marks for its rich feature set and the economy with which the program is implemented. For example, a single toggle button lets you

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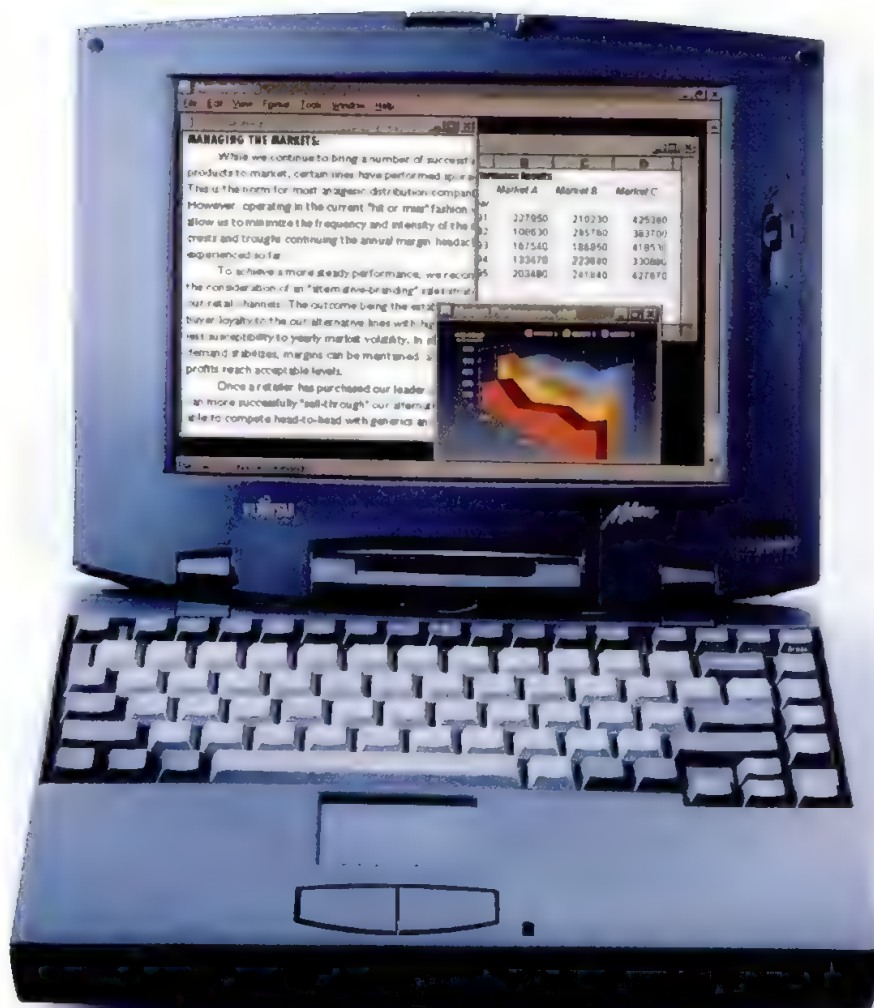
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MPEG VIDEO

MPEG-1 Video to Go

The Media Express MPEG card taps the power of Zoomed Video to play full-motion video on laptop PCs. —By Jan Ozer

Rather than embed MPEG-1 chips in the motherboard of its Tecra laptop computers, Toshiba invented a new architecture, Zoomed Video (ZV) Port, to allow PC Cards to decode MPEG video. The first card with such capabilities, Apex Data's \$249 Media Express MPEG card, produces full-screen, full-motion MPEG-1 video in 16-bit color. It is ideal for road warriors who use their Tecras for MPEG-enabled presentations.

Briefly, ZV provides a direct, high-speed connection between the PC Card and the laptop's graphics and audio subsystems—like the VESA Feature Connector on most graphics cards, only much faster. This increased speed is essential for smooth playback of MPEG-1 video, which requires data rates that can bog down even the PCI bus.

Although ZV is an open standard, Toshiba is the only vendor currently supporting it. (First Looks, June 25, 1996).

Media Express is a Type II PC Card built around Sigma Design's EM7110 chip set and Sigma drivers. The product supports both the RealMagic and the OM-1 programming interfaces, and it is compatible with standard MPEG (.MPG) files, as well as with CD-i and VideoCD 1.0 and 2.0 (.DAT files). Media Express ships with Windows 95 and Windows 3.1 drivers and with Sigma's RealMagic CD-Station, an MPEG-1 viewer.

You install the card by running the setup program from a floppy disk. The program crashed after our first installation, so we uninstalled both Media Express and two software MPEG players. When we reinstalled Media Express, it ran without a hitch.

We tested Media Express on a Tecra 720CDT with a brilliant 12.1-inch 16-bit display. The card produced vivid colors and full-frame playback at resolutions



ranging from 352 by 240 to 1280 by 1024. At smaller resolutions, the video was crisp and clear. At larger resolutions, the image became slightly pixelated, because the Tecra's screen (like most LCD panels) can display only at fixed pixel sizes. Faint pixelation was also evident when sending a scaled MPEG video stream to an external monitor, because the MPEG chip set doesn't filter or interpolate. This effect was discernible only at close range, however; it wouldn't be visible from across a conference table.

Not surprisingly, Media Express proved compatible with a range of RealMagic MPEG-1 and VideoCD titles, but it had a slight problem with OM-1 compatibility, refusing to play video

SNEAK PREVIEW: Media Express is the first PC Card that can decode full-motion MPEG-1 video on ZV-capable notebook PCs.

files from the MPEG-1 version of Microsoft Encarta. If you're using an authoring program to integrate video into a full-scale presentation, you should test Media Express early in the design cycle. On the other hand, if you just want to play full-screen MPEG-1 files from Media Player, you should have no problem.

MPEG-1 is clearly the technology of choice for video presentations, and Apex Data's Media Express is the only solution for playing MPEG-1 video on ZV laptop computers.

Media Express MPEG card. List price: \$249. Requires: 8MB RAM, 2MB hard disk space, Microsoft Windows 3.1 or later or Windows 95, ZV-enabled computer with Type II Card slot. Apex Data, Fremont, CA; 800-841-2739, 510-623-1231; www.apexdata.com. Circle 410 on reader service card.

WEB UTILITIES

Clearing a Path on the Web

Clearweb creates site maps to help visitors find their way around the Web. —By David Haskin

There are plenty of search engines that help find Web sites, but we often get lost once we get to those sites. Clearweb's ability to create and publish visual maps of Web resources benefits both users and developers with this problem.

Like NetCarta's CyberPilot Pro, Clear Software's \$99 Clearweb creates hierarchical text-based outlines that serve as site maps. The outlines' headings and subheadings correspond to the page titles. Using a Clearweb map is like using Windows Explorer: You can view more or fewer levels, or jump directly to a page.

Clearweb goes further than CyberPilot Pro by also creating hierarchical charts of a site with boxes representing each page. But this approach provides less useful information than the outline view.

You can determine how many levels of a site to include

in a map, have Clearweb verify that saved addresses are still valid, and sort a map's URLs and page titles in alphabetical order. You can also add your

ful for developers, who can collect links, create a map, and use Clearweb's included Java applet to display the map in a Web page. Site visitors using the applet can interact with the map the same way they would with the standalone application: At the top of the screen is a search box for finding words or phrases within the map.

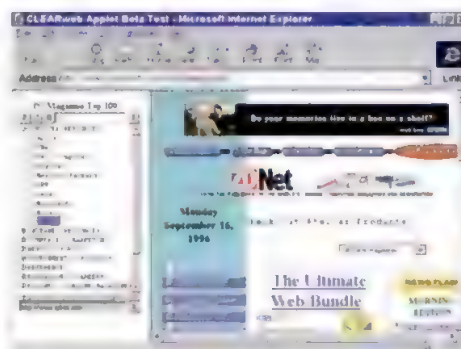
In case you want to try Clearweb before you buy it, Clear

Software offers a free, trial version, which restricts you to site maps containing a maximum of 150 pages.

Clearweb is an excellent way for Web users to find their way around complex sites and for Web developers to provide a helping hand.

Clearweb 1.0. List price: \$99. Re-

quires: 4MB RAM, 3MB hard disk space, Microsoft Windows 3.1 or Windows 95. Clear Software Inc., Newton, MA; 800-338-1759, 617-965-6755; www.clearsoft.com. Circle 409 on reader service card.



CYBER CHARTS: Developers can help Web users navigate sites by creating maps with Clearweb.

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FINANCIAL SOFTWARE

StreetSmart Goes Pro

With real-time market data, StreetSmart Pro Platinum challenges institutional investment products.—By Sebastian Rupley

A variety of resources—both software and online content—cater to the weekend investor, providing the ability to execute trades online or receive delayed quotes. But Charles Schwab & Co. has taken electronic brokerage services to a new level with StreetSmart Pro, a package designed for the active trader who needs instant information.

StreetSmart Pro comes with three types of monthly information subscriptions, Silver, Gold and Platinum, which are designed for different levels of investors. All three offer basic online trading, with a 10-percent commission discount on trades placed through Schwab. All the required software—and in the case of the Platinum subscription, hardware—is free to active traders (clients who make at least two transactions a month and have \$25,000 or more in Schwab accounts).

The Silver plan, at \$99 per month, features Reuter's Money Network research information and news, and Telescan's charting and screening platform for stocks and options. The Gold plan adds delayed quotes from Signal and costs \$159 a month. For the serious trader, the Platinum plan adds real-time quotes from Signal and costs \$249 a month.

The real-time quotes from Signal are transmitted via FM, cable, or satellite signals to a black box about the size of a hard disk. Our box plugged easily into a serial port and fed data to Signal's Data Manager software. Configuration was automatic; the only chore was customizing the trading screen.

Data Broadcasting's Signal service is the pièce de résistance of StreetSmart Pro, thanks to its soft-



BLACK BOX: StreetSmart Pro Platinum customers get real-time market data via a small box that plugs into the PC.

ware sophistication. We were able to set up a trading screen with real-time multiple windows—one for tracking real-time stock quotes,

one for updating a portfolio and its value, and one for tracking stock index prices. We also set pop-up alerts to go off when indices such as the S&P 500 and Nasdaq reached certain values. Users can also set up pop-up alerts for specified levels of trading volume.

This level of customization beats anything found on financial Web sites or in online services and promises to be a real boon for serious traders who may be tracking many markets at once. The Signal software and real-time data feed lift StreetSmart Pro to the level of more expensive institutional trading packages, such as Omega Research's TradeStation.

StreetSmart Pro's \$249 Platinum subscription plan is a bargain for the serious trader. The monthly fee of \$249 may seem steep, but a user who makes five or six trades per month can recoup the fee through the 10 percent discount on commissions alone. Real-time quotes represent added invest-

ment return for sophisticated investors who can use them to track up-to-the-minute bid/ask spreads on volatile securities.

StreetSmart Pro's Silver and Gold subscription plans have many competitors on the Web, which is a good source for free delayed quotes. (Try www.dbc.com.) And several companies including Omega Research (www.omegaresearch.com) offer free downloadable technical charting software. StreetSmart Pro's Platinum Plan, however, is great news for the serious trader who wants all the hardware and software required to trade any security in real time.

StreetSmart Pro. List price: Monthly subscription, \$99 to \$249. Requires: 16MB RAM, 45MB hard disk space, Microsoft Windows 3.1 or Windows 95 Charles Schwab & Co. Inc., San Francisco; 800-450-0669, 303-639-2000; www.schwab.com. Circle 407 on reader service card.

UTILITIES

Windows Wake-Up Call

More powerful than System Agent, ClockMan95 schedules alarms and automates common tasks.—By Neil Rubenking

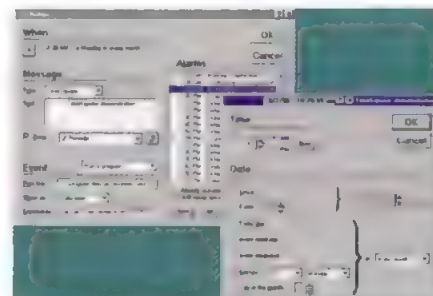
ClockMan95, a \$79.95 Microsoft Windows 95/NT utility from Graphical Dynamics, lets you schedule alarms that display a message, start a program, or both. An alarm can feed keystrokes to the program it activates or trigger a command script. ClockMan95 supports LAN-based group scheduling and permits multiple alarm sets.

Every alarm activates at a certain time on one or more days defined in the When dialog box and optionally plays a .WAV file or a series of beeps. You can fine-tune scheduling with a WIL (Windows Interface Language) script.

Three of ClockMan95's five message types give the user control over the alarm's action. Announcement and Confirm wait until the user presses OK; Confirm also allows the user to cancel the scheduled task. A Countdown message requests confir-

mation but executes the associated task automatically after a specified time. The Invisible and TimeSquare messages play the alarm sound and execute the action. TimeSquare scrolls the message text in the active window's title bar, but this feature caused several access violations under Windows 95 during our testing, and under some circumstances it displayed text incorrectly.

A ClockMan95 alarm can run a



WINDOWS WORKER: ClockMan95's When dialog is a scheduling command center.

script written in WIL, a Basic-like language with over 400 functions. WIL scripts can launch programs in sequence, read the contents of message boxes, and control programs via Dynamic Data Exchange (DDE). ClockMan95 provides Automation Assistants that generate WIL code for such tasks as retrieving e-mail and checking for viruses. A free developer's kit allows third parties to create Assistants. Check the company's Web site for new Assistants.

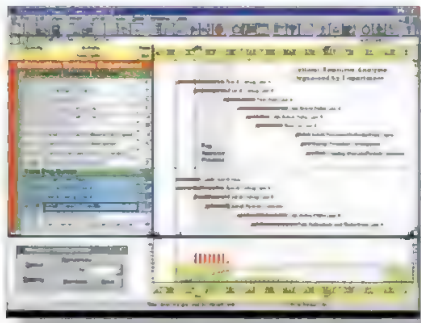
The flexible scheduling and powerful automation of ClockMan95 make it vastly superior to System Agent, part of the Windows 95 Plus! Pack. ClockMan95 has the power to handle

your task-scheduling needs.

ClockMan95. List price: \$79.95 Requires: Microsoft Windows 95, or Windows NT 3.51 or later. Graphical Dynamics Inc., Seattle; 800-779-1799, 206-935-6032; www.graphicaldynamics.com. Circle 408 on reader service card.

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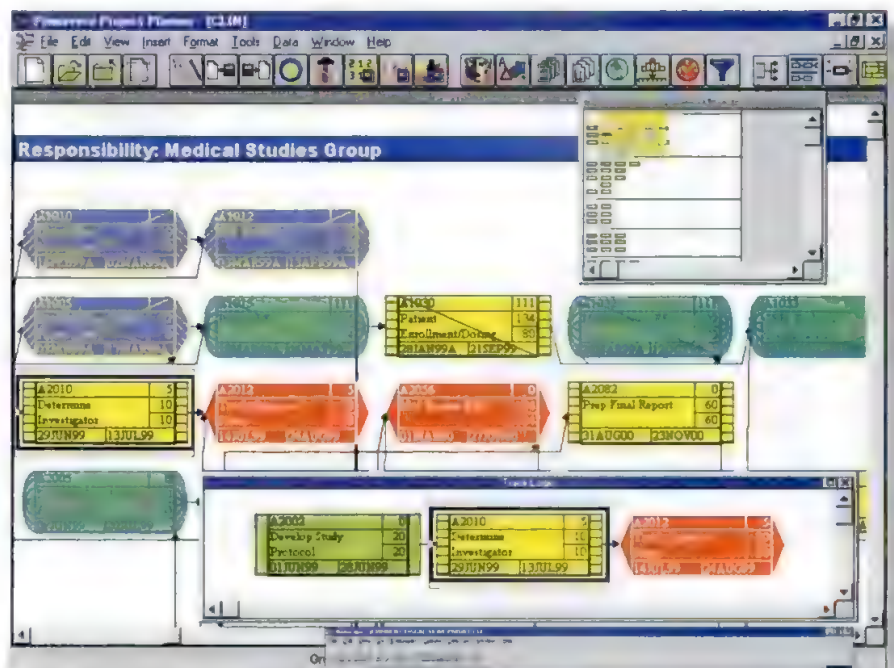
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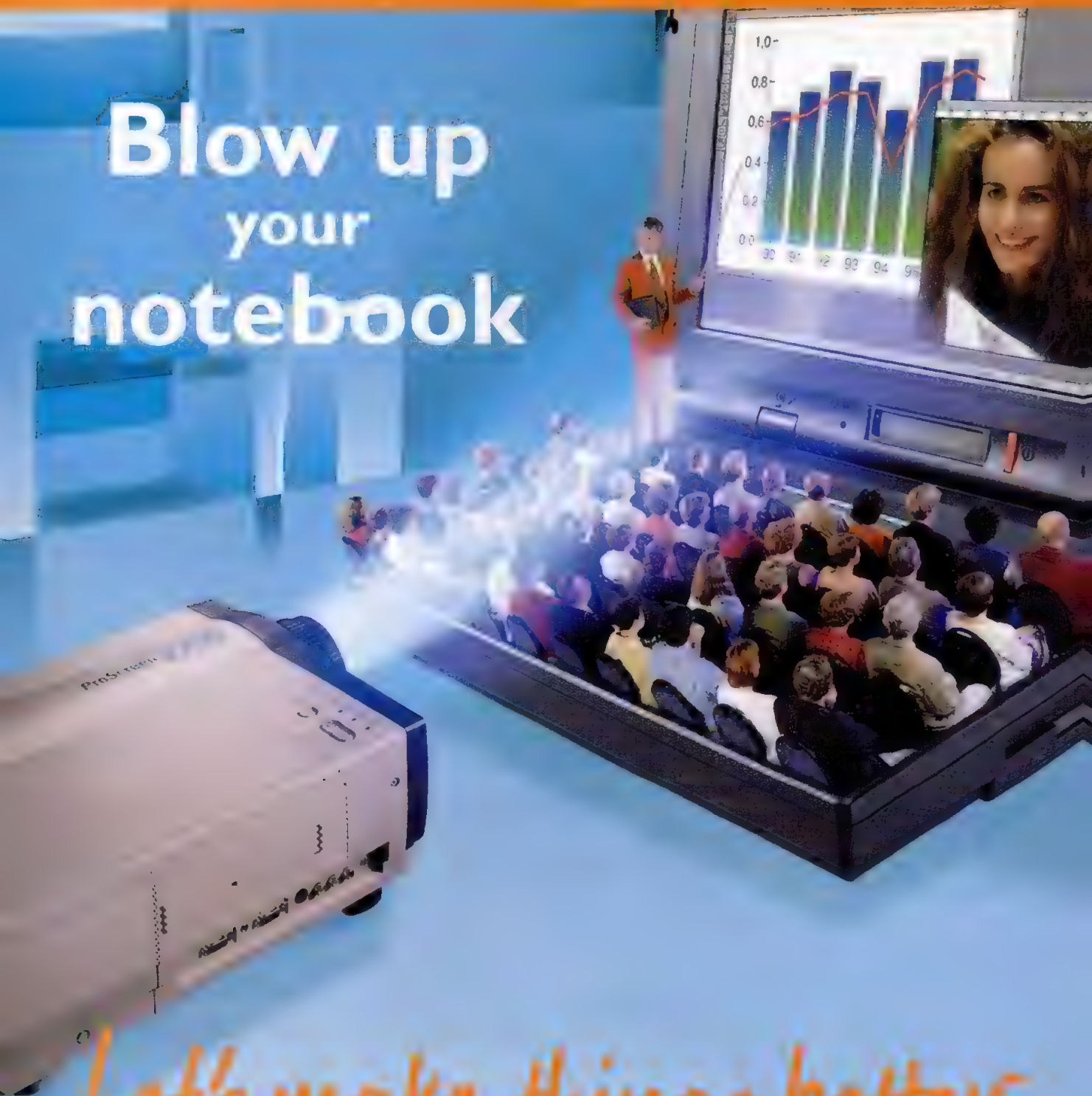
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First Looks

NOTEBOOKS

Mass Storage to Go

Panasonic's state-of-the-art CF-62 has a PD-CD drive and a high-resolution display. —By Cade Metz

With the arrival of the \$5,400 Panasonic CF-62 notebook, optical storage is no longer limited to desktops. Panasonic has given mobile PC users the option of a PD-CD drive—a hybrid device that is both a phase-change dual rewritable optical drive and a standard 4X CD-ROM drive. Although large, weighty, and cumbersome, the CF-62 allows for 630MB of data storage on light and unobtrusive cartridges.

At 9.5 pounds and almost 2.5 inches thick, the charcoal-gray CF-62 system stretches the definition of notebook. Add the power adapter and cord and the travel weight rises to over ten pounds. Like the equally weighty Toshiba Tecra 720CDT (First Looks, June 25, 1996), the CF-62 has an XGA resolution (1,024 by 768 pixels) screen that measures 12.1 inches diagonally.

AUTO DRIVE

The CF-62's PD-CD drive, which resides beneath the keyboard, is unlike anything else on the market. Press the Eject button just below the spacebar and the system performs a mechanical ballet. The front of the keyboard rises to reveal a tray that can accommodate either a PD-CD cartridge or a standard CD-

ROM disk. A gentle nudge of the tray sends it back into the machine and automatically brings the keyboard back into place. The whole process takes no more than 5 seconds.

The drive can alternate between PD mode and CD mode on the fly. Microsoft Windows 95 can format these PD car-



tridges—one is included—and the system includes a copy of Seagate Backup.

You'll have to get used to the system's dual personality, however. The PD portion uses the D: drive, while the CD drive takes drive letter L:. An LCD panel above the keyboard indicates which mode the system is operating in, but it doesn't remind you of the letter change.

Due to the presence of its PD-CD drive, the rear of the CF-62

has two fans that continuously cool the system but also create a steady flow of annoying white noise. Other than this drawback, the system is quite user-friendly. There are two plastic feet at the rear of the machine that can be lowered to put the keyboard on an incline for a more comfortable stance. A responsive touch pad is situated in the middle of an ample palm rest.

The system also has a built-in microphone at the front of the chassis, a 115-Kbps infrared wireless port at the rear, and speakers on the hinges of the display. Both



QUICK-CHANGE ARTIST:

Press the Eject button located just below the spacebar and the Panasonic CF-62 automatically raises its keyboard to reveal a combination PD-CD optical drive.

the battery and floppy drive are easily removable and replaceable, while memory can be readily added via a compartment beneath the machine. A pair of Type II PC Card slots—equipped with eject buttons—are stacked on the right of the machine.

The CF-62 both impressed and disappointed us during testing. The PD-CD affords strong data-transfer and backup capabilities in PD mode, but the CF-62's CD-ROM WinMark score

was almost 65 percent lower than that of the average presentation-class machine ("Portable Property," August 1996).

KEEPS GOING AND GOING...

The system's huge lithium ion battery marks a turning point for Panasonic notebooks. The CF-62 exceeded three hours on our BatteryMark test; its predecessor rarely lasted more than an hour between charges. With a 1.35GB Toshiba EIDE hard disk, a 32-bit Chips & Technologies video chip set, and 4MB of VRAM, the CF-62 delivered Disk WinMark and Graphics WinMark scores 11 percent and 16 percent higher, respectively, than the average presentation-class notebook. The unit's CPUmark and Winstone scores were also impressive.

Panasonic also sells a 100-MHz Pentium version of the CF-62 with an 810MB hard disk and a display for about \$700 less.

The Panasonic CF-62 shows that you can have it all in a notebook: high performance, exceptional screen quality, and optical backup. But you'll have to endure a travel weight that exceeds ten pounds.

Panasonic CF-62. Street price: With Pentium/133 CPU, 256K external cache, 16MB RAM, 1.35GB hard disk space, 12.1-inch XGA display, \$5,400. Panasonic Personal Computer Co., Secaucus, NJ; 800-662-3537, 201-271-3182; www.panasonic.com. Circle 431 on reader service card.

BENCHMARK TESTS

Panasonic CF-62



With the exception of its disappointing ZD CD-ROM WinMark 96 score, the Panasonic CF-62 notebook outperformed the average presentation-class system ("Portable Property," August 1996). The notebook's ZD Winstone 96 and ZD Winstone 32 scores, at 49 and 64, respectively, both beat the average scores from our roundup. The

standout was the CF-62's battery time of over 3 hours.

To gauge the performance of this notebook, we used ZD Winstone 96, Version 1.0; ZD Winstone 32, Version 1.0; and ZD WinBench 96, Version 1.0. In addition, we used ZD BatteryMark to measure battery life. Each system had 16MB of RAM and ran Microsoft Windows 95.

Higher scores represent better performance	ZD Winstone 96	ZD Winstone 32	ZD Graphics WinMark 96	ZD Disk WinMark 96	ZD CPUmark 16	ZD CPUmark 32	ZD CD-ROM WinMark 96	ZD BatteryMark
Panasonic CF-62	49	64	131	896	262	259	15*	3:08
Average presentation-class notebook (8/96)	46	55	114	625	221	215	423	2:13

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STATISTICAL SOFTWARE

PC Survey Says...

Designing, tabulating, and analyzing a survey is a labor-intensive job. That is, until now. —By Sheryl Canter

Anyone who followed the Presidential election knows how important surveys and polling data have become. Two packages, Survey Pro for Windows 2.0 from Apian Software (\$795) and SurveyWin 3.01 from Raosoft (\$495), can handle much of the grunt work of creating a survey, leaving you with more time for the job's creative aspects.

Survey Pro's integrated, intuitively designed system lets you quickly create polished questionnaires and reports, but stops short of sophisticated analysis. SurveyWin has more analysis options but requires add-on products, and its user interface is clunky and hard to learn.

SURVEY PRO FOR WINDOWS 2.0

Survey Pro cleanly integrates the main parts of survey administration. When you design a questionnaire, the program automatically creates a database template. Any changes to the questionnaire update the associated database and any reports you've created.

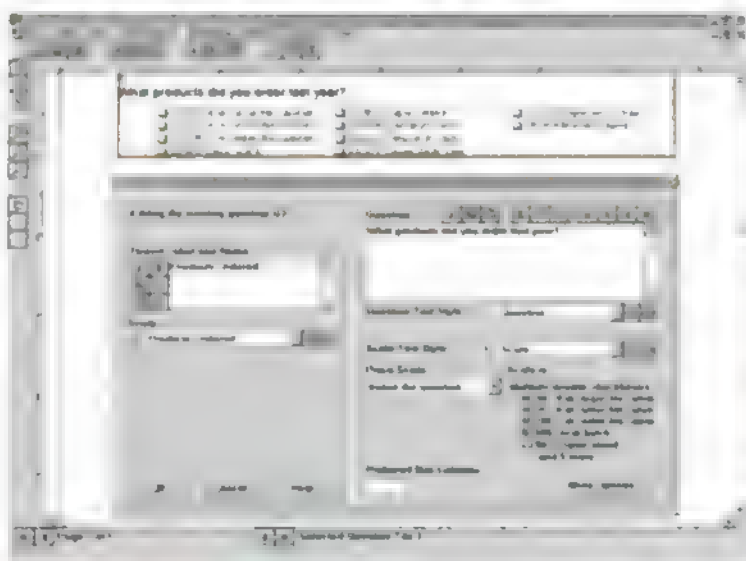
It's easy to create professional-looking survey forms in Survey Pro. The Question Edit dialog brings all the options together in one place, and Survey Pro's automated formatting gives your forms polish.

Survey Pro is designed to produce printed forms to be filled out manually; there is no option for electronic data entry. Although a separate utility called Keycollect (\$195) is available for data entry, it's designed to be used by data entry clerks, not questionnaire respondents. You can also use

OMR/OCR (optical mark recognition/optical character recognition) or high-speed scanning systems from companies such as Scantron to get your data off the page and into your computer.

Survey Pro's three-paneled data entry window is designed for efficiency. The survey is displayed in the right-hand pane; the data entry window is in the upper left, with a pick list of options below it. Built-in error checking prevents invalid entries, and a master form lets you enter data once and apply it to a group of forms.

Survey Pro can create printed reports and presentation slides. If you use your computer for display, the "animate" option lets you watch charts shift as you display the data for different groups. Analysis is limited to frequency distributions and cross-tabula-



ONE-STOP SHOPPING: Survey Pro's Question Edit dialog lets you set the question text, style, and format all in one place.

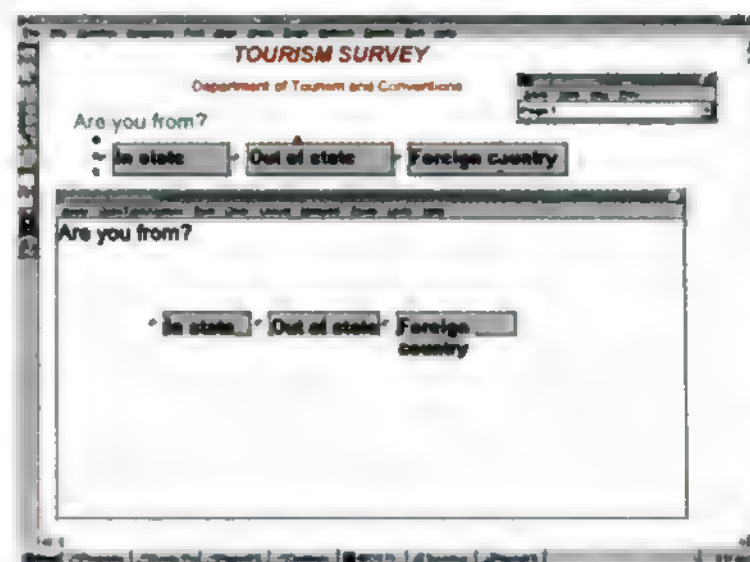
tions, but what the program does, it does well. An easy-to-use recoding facility lets you regroup data into more meaningful categories for analysis. Cross-tabulations are easy to define, and they execute quickly. The graphics options are flexible and attractive. If you need to perform more sophisticated analyses, you can export the data in comma-delimited or fixed-field ASCII format for import into a statistics package.

All told, Survey Pro places a greater emphasis on survey preparation and tabulation than on the sophisticated analysis of results. **Survey Pro for Windows 2.0.** List price: \$795. Requires: 8MB RAM, 11MB hard disk space, Microsoft Windows 3.1 or later. Apian Software, Menlo Park, CA; 800-237-4565; fax, 415-694-2904; www.apian.com. *Circle 403 on reader service card.*

SURVEYWIN 3.01

SurveyWin's interface takes some getting used to because it doesn't adhere to Windows conventions. But once you learn how to use it, you'll find useful features that help you collect and analyze survey data.

There are many oddities about the interface. For example, some of the menu bar items launch pull-down menus, while others launch dialog boxes or



PICK AND CHOOSE: SurveyWin's Compose Question window features a WYSIWYG display and a bar menu across the top of the screen.

trigger immediate actions. To make matters worse, there's no indication of whether a menu item has an associated pull-down menu, so it's easy to run modules by accident.

You define questionnaire items in the Compose Question window, which uses a WYSIWYG display with a menu bar across the top for setting options. The program's Question Types dialog lets you choose from a variety of Windows controls such as Single Listbox, Multiple Listbox, and Combo box, but automatic formatting is limited. The bottom line is that it takes more time to produce a

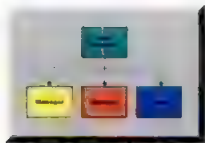
polished survey form with SurveyWin than with Survey Pro. A plus, however, is that SurveyWin can convert forms to HTML format for distribution on the Web.

SurveyWin's electronic data entry capability requires the purchase of additional software: USurvey (\$395) lets you create runtime forms in which data cannot be edited; UFill (\$595) lets you create editable runtime forms with password protection; UAdmin (\$995) includes a respondent confidentiality feature and lets you gather information from electronic forms. There are no built-in features for scanning in questionnaire data, and data entry clerks must use the same mouse-driven data entry facility as respondents.

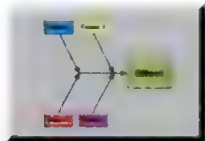
SurveyWin offers basic frequency counts, cross-tabulations, and charting. Graphs are not always centered in the windows, and customization options are limited. For more sophisticated analyses such as t-tests or variance analyses, you must use the DOS version of the program, which is included with the package. To create printed reports, you must buy yet another

add-on product called EZReport (\$149), which is a DOS-based report writer.

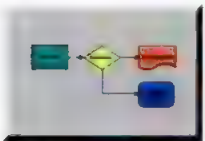
The basic SurveyWin package is a little more than half the cost of Survey Pro, but with all the add-ons its price quickly increases. Unless you need electronic data entry or advanced statistical analysis, Survey Pro is the better choice. **SurveyWin 3.01.** List price: \$495. Requires: 4MB RAM, 10MB hard disk space, Microsoft Windows 3.1 or later, or Windows 95, Windows NT, or OS/2. Raosoft Inc., Seattle; 206-525-4025; fax, 206-525-4947; www.raosoft.com/raosoft. *Circle 404 on reader service card.*



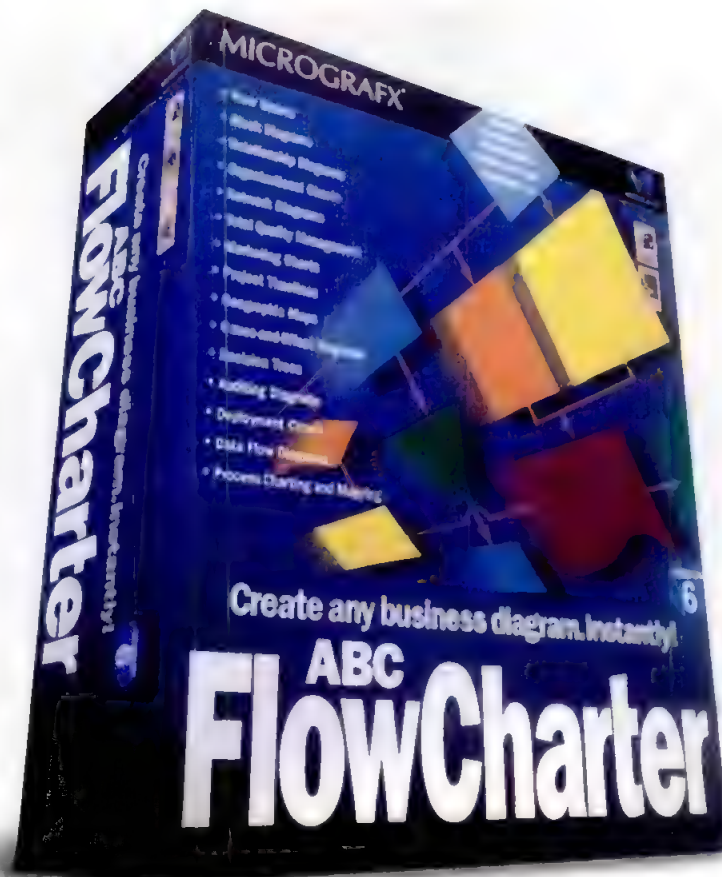
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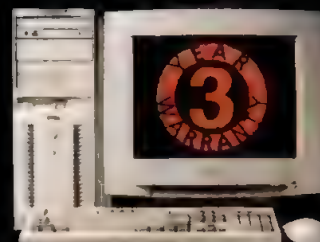
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First Looks

CONTACT MANAGERS

More than an Address Book

Janna Contact Personal raises contact managers to new heights with the ability to store more than just words. —By Nelson King

Janna Contact Personal, from Janna Systems, has successfully resolved the conflict between power and ease of use that we inevitably find in contact managers. This 32-bit version of the \$49 JCP crams most of the features you want into a clean and simple interface.

The interface, which owes much to Microsoft Office, uses tabbed pages and adjustable frames to display contacts and calendars neatly. We particularly liked the searchable list of contacts displayed side by side with detailed information. Customizable toolbars provide access to all major operations, and data input is greatly aided

by numerous shortcuts and an Adding Contact wizard.

Based on Microsoft's Jet database engine, JCP can now handle an unlimited number of contacts, addresses, custom fields, and categories. The ease of adding custom fields and categories gives JCP considerable power and flexibility. Other improvements in this version include new Import and Export wizards. Telephone dialing is also better integrated with call tracking.

For scheduling, the presentation of weekly, monthly, and yearly calendars is teamed with a convenient daily view. Since entries can be edited directly in the calendar, this process

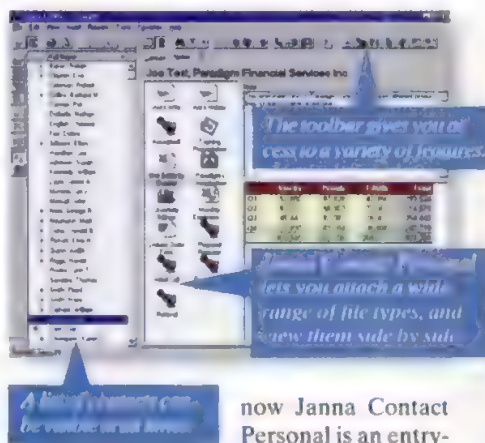
is quick and simple.

JCP goes beyond mere words; it can store objects from any OLE 2.0 application. Documents and other objects are not individual files but are stored in the contact database, which makes them difficult to access except through JCP.

JCP is a bargain with only a few compromises. It's a standalone product with no network pretensions. It does little with Internet connections, and it doesn't offer sophisticated organization tools. Nor does it have any of the features of such heavy-duty sales management programs as Lotus's Organizer.

JCP's solid user interface will soon be incorporated into Janna Contact's Professional and Enterprise editions. As it stands,

CROSSROADS: JCP's uncluttered interface is the gateway to a multitude of tasks.



now Janna Contact Personal is an entry-level contact manager that balances its full capabilities with ease of use.

Janna Contact Personal. Street price: \$50. Requires: 12MB RAM, 12MB hard disk space, Microsoft Windows 95 or Windows NT. Janna Systems Inc., Los Gatos, CA; 800-268-6107; www.janna.com. Circle 402 on reader service card.

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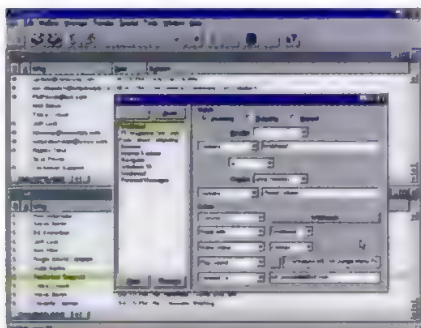
First-Class Delivery

Qualcomm's Eudora Pro 3.0 continues to be the e-mail program for power users. —By Scot Finnie

With competent e-mail modules tucked into Netscape Navigator and Internet Explorer, you might think you don't need a standalone e-mail application. But Qualcomm's \$60 Eudora Pro 3.0 shows that there's a big difference between a utilitarian e-mail program and one that makes you more productive.

Eudora Pro's versatile Filters feature lets you automatically sort messages into user-created containers called mailboxes. Each filter can take up to 5 resulting actions that you pick from a list of 15 possibilities. Although the action that you'll most often use will be a mailbox transfer, you can play a notification sound specific to a

type of incoming message, launch an attached data file into its associated application, automatically reply with a form message, or uti-



60 FILTERS: Eudora Pro is the smart way to sort e-mail by content before you read it.

lize any combination of these actions. When you use the Filters function as an automated response tool, it accesses the program's new Stationery feature, which lets you create and store

e-mail form letters. A Reply To feature is perfect for the back end of a Web-based customer service form for responding to specific support questions. During our evaluation, we found that Eudora's filters are highly selective and easy to create, and they can be real time-savers.

Eudora is also fast becoming the Internet e-mail standard. Several companies (including askSam Systems and Visioneer) are developing software that ties into Eudora as a data transport mechanism.

Eudora also supports multiple e-mail accounts and signature files. The program finally has a configurable toolbar. There's full support for the MIME rich-text format, including selectable typefaces, font sizes, and colored text. That's in addition to active URLs, spell-checking, and excellent Windows 95 integration.

On the other hand, Eudora doesn't offer multiple levels of



Join Us Online
from November 11 to 15 to discuss Eudora 3.0 with reviewer Scot Finnie and Qualcomm representatives.

WWW.PCMAG.COM/DISCUSS.HTM

undo or the ability to copy received e-mail addresses automatically to the address book. Eudora also slights one or two Windows 95/NT conventions, such as right-mouse-button functionality. By contrast, ConnectSoft's 16-bit E-Mail Connection 3.0 can automatically build your address book from received messages. But EMC is a Windows 3.1 application, and it lacks the automatic mes-

sage identification, sorting, response, and forwarding that is so richly implemented in Eudora.

The basic message-in, message-out mail clients are quickly becoming a thing of the past. Eudora Pro 3.0 has shown the way.

Eudora Pro 3.0. Street price: \$60. Requires: 4MB RAM, 4MB hard disk space, Microsoft Windows 3.1x, Windows 95, or Windows NT 3.5x or 4.0. Qualcomm Inc., San Diego; 800-238-3672, 619-658-1291; www.eudora.com. Circle 401 on reader service card.

A DESKTOP THAT'S ACTUALLY CAPABLE OF

*I'm no wimp.
But it's pretty
hot in here.*

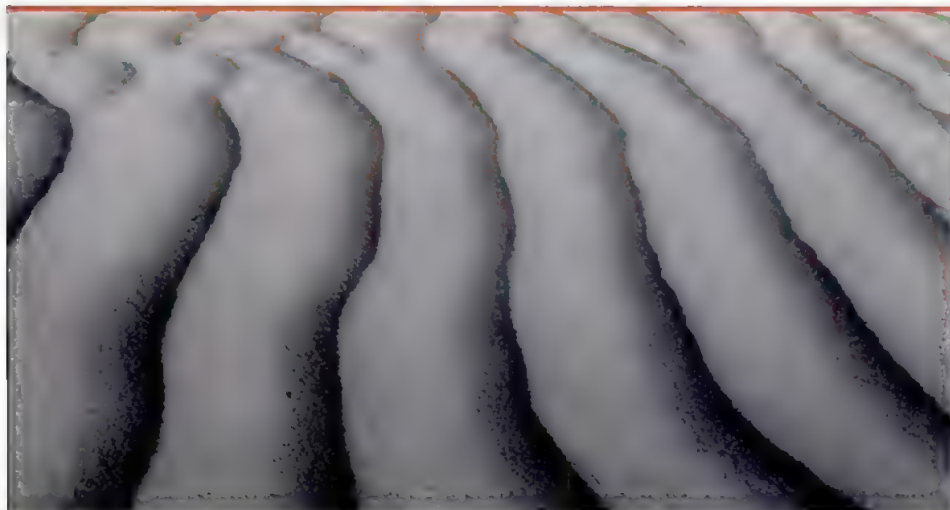


Talk about considerate. Beyond having a thermal sensor that tells you if it's too hot, the new Compaq Deskpro will warn you if its hard drive's about to fail anywhere. It's all part of what we call the next generation of Intelligent Manageability. Among other things, it

[illegible]



TELLING YOU IT'S TOO HOT. *Cool.*



allows you to take inventory of all your hardware and software from one location. In case of hard drive failure, it backs up your data on the network; and now, thanks to our new PD-CD drive backup, it also preserves your data locally. There's even a sensor in

the hood that alerts the support desk if anyone's tampered with it.

Intelligent Manageability is still based on open industry standards that ensure compatibility and integration with any network. Our partnerships with Microsoft, Novell, Intel and others

give IS managers a broader range of integrated solutions. And to minimize installation and your configuration time, we provide an upgradeable

integrated NIC and network-ready software which protects your investment and allows for growth. Ultimately what you get with Intelligent Manageability is lowered cost of ownership. Add to that a three-year warranty, plus dedicated toll-free technical support that's open for business seven days a week, 24 hours a day. Control. It's what makes the new Compaq Deskpro so hot. In a cool kind of way. For more information, visit us at www.compaq.com or call 1-800-392-8883.

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Courier I-modem



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*Manufacturer's Suggested Retail Price, Network Computing, October 1, 1996

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Second Looks

LIVING WITH THE PRODUCTS WE REVIEW

By Brian Nadel

WEB SITES

Where Is That FedEx Package?

THE FEDERAL EXPRESS Web site offers a good example of how to turn the power of the Web to your advantage. But in the past to track a FedEx package heading to some parts of the world, you had to do it on the phone with a FedEx operator. Not anymore.

The next time you send or expect to receive a FedEx package, try the company's Web site (www.fedex.com), which now has tracking for most of the globe. Just type in your package's airbill number, the date it was sent, and the destination country. The site quickly returns a running chronology of where the package is and where it's been. This list

includes when the package went out the door, if and when it was received, and who has it. In short, the site provides you with all the information you need to confirm either that your package got safely to its

destination or that a delivery is on the way to you.

The newest part of the FedEx system lets you tap into this powerful business tool without using the Web. All you have to do is send an e-mail note to track@fedex.com. Include the word "airbill" followed by a space and the tracking number (airbill 400-1234-5678, for example). When the package arrives at its destination, you get a return e-mail message with the delivery details. You can even track as many as 20 individual parcels in one e-mail note, although the status notes roll in to your in-box individually, as each package is received at the other end.

So, whether you're sending almonds to Albania or zithers to Zimbabwe, you'll know they got there OK.



NOTEBOOKS

A More Thoughtful ThinkPad

THE SLEEK BLACK LOOK OF the IBM ThinkPad line appeals to notebook buyers so much that a

good portion of them also buy the company's matching Space Saver keyboard.

Unfortunately, when connected to a ThinkPad 760 notebook, the keyboard caused system crashes, lock-ups, and an occasional loss of typed characters ("Portable Property," August 1996). There are two fixes for these problems. The quick one is a downloadable patch that lets you use the keyboard but not its embedded pointing stick or an external mouse. Go to www.pc.ibm.com and download YPTF\$034 (for

DOS and Windows systems) or YPTF\$035 (for OS/2 systems).

The better solution is an adapter that you insert in-line on the mouse connector. It allows the keyboard and pointing device to coexist peacefully. You can get the adapter free from IBM (800-772-2227); ask for FRU 83h6472, and be sure to have your machine's serial number handy to verify that you own a ThinkPad 760.

Windows 95 is a two-handed operating system, so we prefer to use both input devices. Our advice is to get the mouse adapter, use it and stop worrying about losing some of the characters you type.

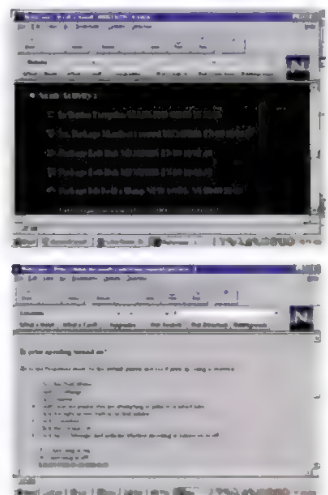
SECOND LOOKS MAILBOX: Tell Second Looks about your experiences with computer products. Contact Brian Nadel via MCI Mail (556-1500), CompuServe (72241,1616), or the Internet (bnadel@zd.com).

PRINTERS

Solving Your Printer Woes

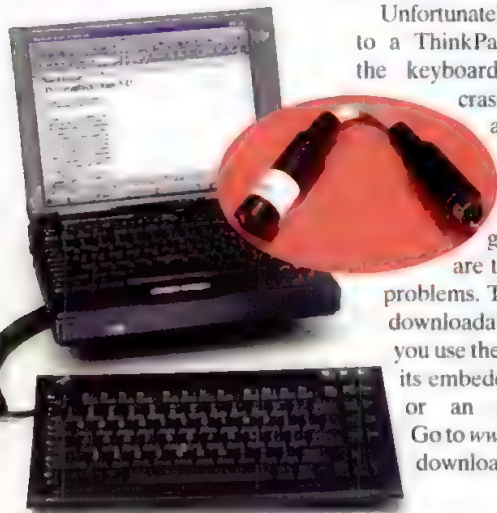
SO MUCH FOR THE PAPERLESS office. One of our daily frustrations is getting information out of the PC and onto paper. You can spend an entire morning polishing a report, adding charts and graphs, only to find that the file won't print. Or if it does, it bears little resemblance to what's on your screen.

Go to Microsoft's Online Printer Troubleshooter page (www.microsoft.com/Windows/Support/PrintTroubleshooter/) and you'll find an interactive form for figuring out what's gone wrong. The page asks if your document didn't print at all, printed slowly, printed partially, distorted or garbled graphics, or lost certain fonts. Your answers take you to the appropriate detailed troubleshooting page.



The solutions are somewhat simplistic. "Reorient the page to landscape if you're only getting part of an image," for example. Still, the Online Printer Troubleshooter helps get your thoughts onto paper.

The solutions are somewhat simplistic. "Reorient the page to landscape if you're only getting part of an image," for example. Still, the Online Printer Troubleshooter helps get your thoughts onto paper.



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Yet for all its lightness, the EzPro 500 produces extremely bright, crisp images. You get 16.7 million dazzling colors and 640 x 480 resolution. And it's just as easy to



set up and use as it is to move—whether you're plugging in to a PC, Mac, or standard video.

Lighter. Brighter. Easier. It's not hard to see why the EzPro 500 beats other multimedia projectors hands down. For more details or a hands-on demonstration, just call 1-800-433-5590.

CTX

Commitment To Excellence

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CIRCLE 329 ON READER SERVICE CARD

New & Improved

NEWS OF ANNOUNCED PRODUCTS AND UPGRADES

By Melissa J. Perenson

A Plethora of Pointers

THE VARIETY AND DIVERSITY OF POINTING devices available underscores the relevance of the saying, "To each his own."

The unique nature of the \$84.95 **Microsoft IntelliMouse** stems from a navigation wheel embedded between the two mouse buttons. The wheel facilitates scrolling and navigating through screens within Microsoft Office 97, Internet Explorer 3.0, and Windows 95 Explorer.

The \$100 **Logitech SurfMan** is a radio-wave device with an integrated trackball that's customized for Web surfing through Logitech's CyberJump software, which provides shortcuts for eight commonly used commands in Netscape Navigator.

Vector Research Corp.'s \$80 **UNIA** is certainly the most full-featured, multifunctional device around. The serial-port mouse includes a numerical keypad with function keys built into the mouse's body.

Microsoft Corp., Redmond, WA; 800-426-9400; www.microsoft.com. *Circle 412 on reader service card.*

Logitech Inc., Fremont, CA; 800-231-7717, 510-795-8500; www.logitech.com. *Circle 413 on reader service card.*

Vector Research Corp., San Jose, CA; 408-298-7898; fax, 408-298-8087. *Circle 414 on reader service card.*

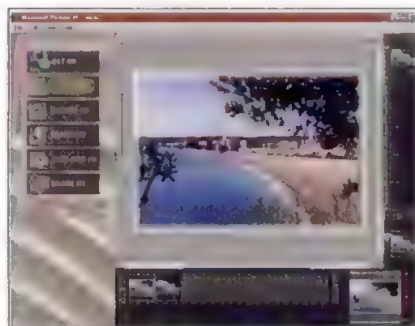


Making Magic With Photos

THE LATEST PHOTO EDITORS make it easier than ever to enhance your photographs digitally, thanks to support for the new FlashPix image format, which uses Microsoft's OLE-structured storage for multiple image resolutions within a single image file.

Microsoft's \$80 **Picture It!** provides an array of creative imaging options for transforming vacation and family photos. You'll find a vast selection of customizable frames, mattes, templates, and special effects for creating everything from collages to greeting cards and calendars. Plus, you'll find tools for manipulating, compositing, and enhancing im-

ages, as well as HTML and e-mail support for slide-show output. A unique feature is the ability to link to Kodak's network printing services to print your images as photographic-quality prints.

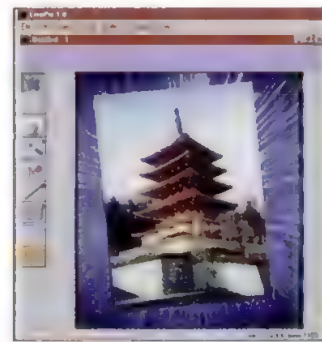


PICTURE THIS: Microsoft Picture It!

Along similar lines is Live Picture's \$65 **LivePix**, which also supports FlashPix technology. In addition to offering the standard-issue set of image-editing tools, the package provides a collection of templates, backgrounds, and special-effects tools for producing such creative projects as collages, greeting cards, calendars, posters, T-shirts, and photo albums.

Microsoft Corp., Redmond, WA; 800-426-9400, 206-882-8080; www.microsoft.com. *Circle 412 on reader service card.*

Live Picture Inc., Soquel, CA; 800-724-7900, 408-464-4200; www.livepicture.com. *Circle 416 on reader service card.*



IMAGES ALIVE: LivePix

Olympus's MO

REMOVABLE STORAGE DEVICES are becoming increasingly important peripherals. Olympus Image Systems' \$389 **SYS.230 Universal Personal Storage System** offers portable storage in both parallel port and SCSI magnetic optical solutions.

Compact and sleek, the two-pound SYS.230 supports 3.5-inch, 230MB SYS.Disk cartridges, which sell for about \$10 each. The SCSI

version has a transfer rate of up to 2.4 MBps and a seek time of under 17 ms.

Olympus Image Systems Inc., Melville, NY; 800-347-4027, 516-844-5000; www.olympusamerica.com. *Circle 415 on reader service card.*



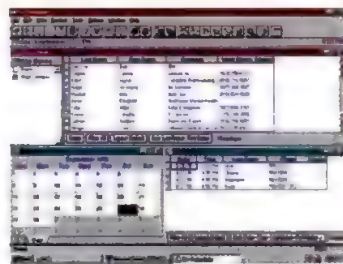
HOT PROSPECT

Putting Yourself On Schedule

Have you just about worn yourself out looking for a flexible personal information manager that suits your needs?

Odyssey Computing's **On-Schedule 3.0 for Windows** may be the solution you've been searching for. One of the most versatile PIMs available, this version adds functionality and conveniences targeted at business users. The intuitive interface has a highly customizable layout, supporting, for example, the ability to have your calendar and phone book on-screen simultaneously, and to have multiple phone books open at the same time.

New to this version are the ability to create custom database filters; provisions for four e-mail addresses per contact and direct links between contact records, Microsoft Exchange e-mail, the Web browser of your choice; and fax and mail-merge wizards. There's also a time tracker for keeping tabs on the billable hours associated with a particular contact record. One indispensable fea-



ture if you want to maintain your PIM on more than one computer is On-Schedule's bi-directional database merge, which lets you merge data from two On-Schedule locations.

Odyssey Computing, 800-965-7224; 619-675-3660; www.odysseyinc.com. *Circle 411 on reader service card.*

New & Improved

Next-Generation Color Scanners

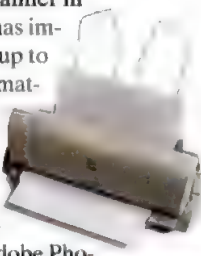


READY FOR THE NEXT WAVE OF COLOR PAGE SCANNERS?

Leading the charge is Lumina's \$250 **ColorScan 3000**. The compact, 24-bit scanner supports up to 300- by 600-dot-per-inch (dpi) optical resolutions, and includes a ten-page automatic document feeder. Bundled with the Twain-compatible scanner are Neusoft's Presto! PageOffice suite for OCR, document filing, business-card management, and basic image-editing, and Lumina's convenient Internet Fax software.

Identical in specs and design is UMAX Technologies' \$250 **PageOffice Color**, which includes Neusoft's Presto! PageManager, and Adobe's PhotoDeluxe image editor.

Logitech has upgraded its sheet-fed color scanner in **Logitech PageScan Color Pro**. The \$349 scanner has improved its resolution to support 24-bit scans at up to 400 dpi. Also new is a detachable, ten-page automatic document feeder, and a driver that allows you to scan directly to an application. Like its predecessor, this unit lets you detach the scanning head for automated scanning of bound and irregular-size originals. A powerful software bundle includes DocuMagix PaperMaster 2.0 SE, Adobe PhotoDeluxe, and Xerox's TextBridge OCR.



For a truly innovative take on color scanning, look no further than Alps MD-4000 Color Printer/Scanner from Alps Electric. The \$699 device uses Alps' patented Micro Dry ink process to produce vivacious and photorealistic output. Though both scan and print times can be lengthy (a 4- by 6-inch image can take up to two minutes at 300 dpi), it's an acceptable trade-off, considering the unit's dual capabilities.

Lumina Office Products Inc., San Jose, CA; 800-586-4620, 408-487-0400; www.lumina2000.com. Circle 417 on reader service card.

UMAX Technologies Inc., Fremont, CA; 800-562-0311, 510-651-4000; www.umax.com. Circle 418 on reader service card.

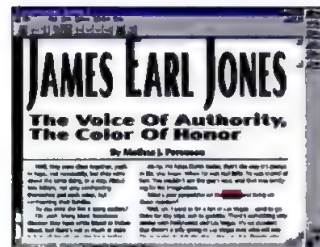
Logitech Inc., Fremont, CA; 800-231-7717, 510-795-8500; www.logitech.com. Circle 413 on reader service card.

Alps Electric (USA) Inc., San Jose, CA; 800-825-2577, 408-432-6000; www.alpsusa.com. Circle 419 on reader service card.

Search and Organizer

MANAGING YOUR SCANNED documents can be daunting.

Easing that task is Iota Industries' \$49 **MyDesk**, which offers an intuitive storage, archiving, and retrieval system. You can scan documents directly to MyDesk, or you can import your documents via Visioneer's PaperPort software link. By automatically performing optical character recognition on imported docu-



ments, MyDesk lets you search within your nested folders for documents containing specific words or phrases.

Iota USA, Norwalk, CT; 800-655-4682, 203-849-1400; www.iota.co.il. Circle 422 on reader service card.

Video Splitter

EVER NEED TO PIPE YOUR PC'S VIDEO feed into two monitors? P.I. Engineering's \$89.95 **Y-SeeTwo** Video Signal Splitter, which draws its power from the keyboard port, lets you simultaneously use two VGA or SVGA monitors displaying resolutions of up to 1,280 by 1,024 at 32-bit color.

P.I. Engineering, Williamston, MI; 800-628-3185, 517-655-5523; fax, 517-



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BRIEFS

Software

Ulead Systems' \$199 **Ulead PhotoImpact 3.01** is now shipping with WebExtensions for preparing and designing graphics, backgrounds, and images for use on the World Wide Web (800-858-5323) Pacific Gold Coast Corp.'s \$49.95 **Turbo Browser 5.2** is a handy file viewer and printing utility that uses an Explorer-like interface to let you view the file alongside your directory tree (800-732-3002) Microsoft's \$55 **Encarta 97 World Atlas** provides detailed, maps and country-specific cultural data (800-426-9400) Add

a spell-checker, thesaurus, and editing tool to any Windows program with hSoft's \$49.95 **WordScribe Professional** (888-293-1264) Clear & Simple's \$39.95 **DisJockey** is a convenient file manager for OS/2 that works with the OS/2 Workplace Shell Desktop (860-658-1204) Globalink's \$169 **Power Translator 6.0** is a 32-bit translation package that supports translation of French, German, Italian, and Spanish documents to and from English (703-273-5600) M-USA Business Systems' \$49.95 **Pacioli 2000 Business Team** includes M-USA's Pacioli 2000 Version 4

for Windows, with its 16 integrated accounting modules and separate components covering payroll and personnel management, time and service billing, personal finance, and more (800-933-6872).

Hardware

Yashida Industries' \$249 **Raynox DCR-2000** is a macro close-up system designed for use with the Kodak DC-50 digital camera. The system includes two macroscopic lenses, a close-up camera stand with a lighted stage, a lens holder, and a stepped scale aid (800-943-



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- 150MHz Intel® Pentium® Processor
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- 59 Watt Lithium Ion Battery
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Recommended
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August 1998
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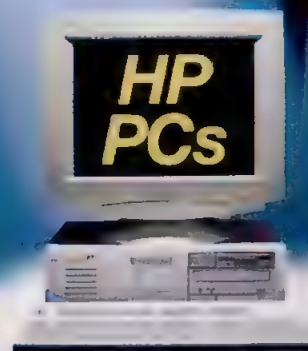


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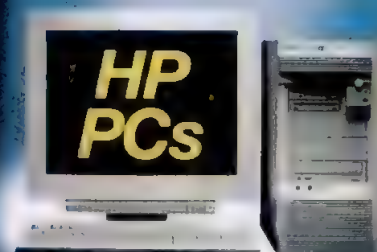


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Sotec America Inc., San Jose, CA; 408-232-0888; fax, 408-232-0899; www.sotec.com. **Circle 428 on reader service card.**

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BRIEFS

2000) **Sigma Design's \$5,995 IntraVideo MPEG Pak** is a hardware/software bundle designed to facilitate the creation of interactive videos for the Web. The package includes Adobe Premiere, five REALmagic Maxima MPEG playback boards, REALmagic Producer, and more (800-845-8086).

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modate those with learning disorders (www.prodworks.com) **AT&T Business Network's** site includes a myriad of business, sales, and marketing resources (www.bnet.att.com) Waite Group Press has launched the **eZone**, where you can participate in interactive computer training courses covering HTML, Perl 5, Java, and C++ (800-545-5914) Looking for a secure e-mail system? **GlobalKey's** eponymous e-mail and conferencing service provides multilevel encryption on its international network. Monthly fees start at \$12.95 (800-539-8006).

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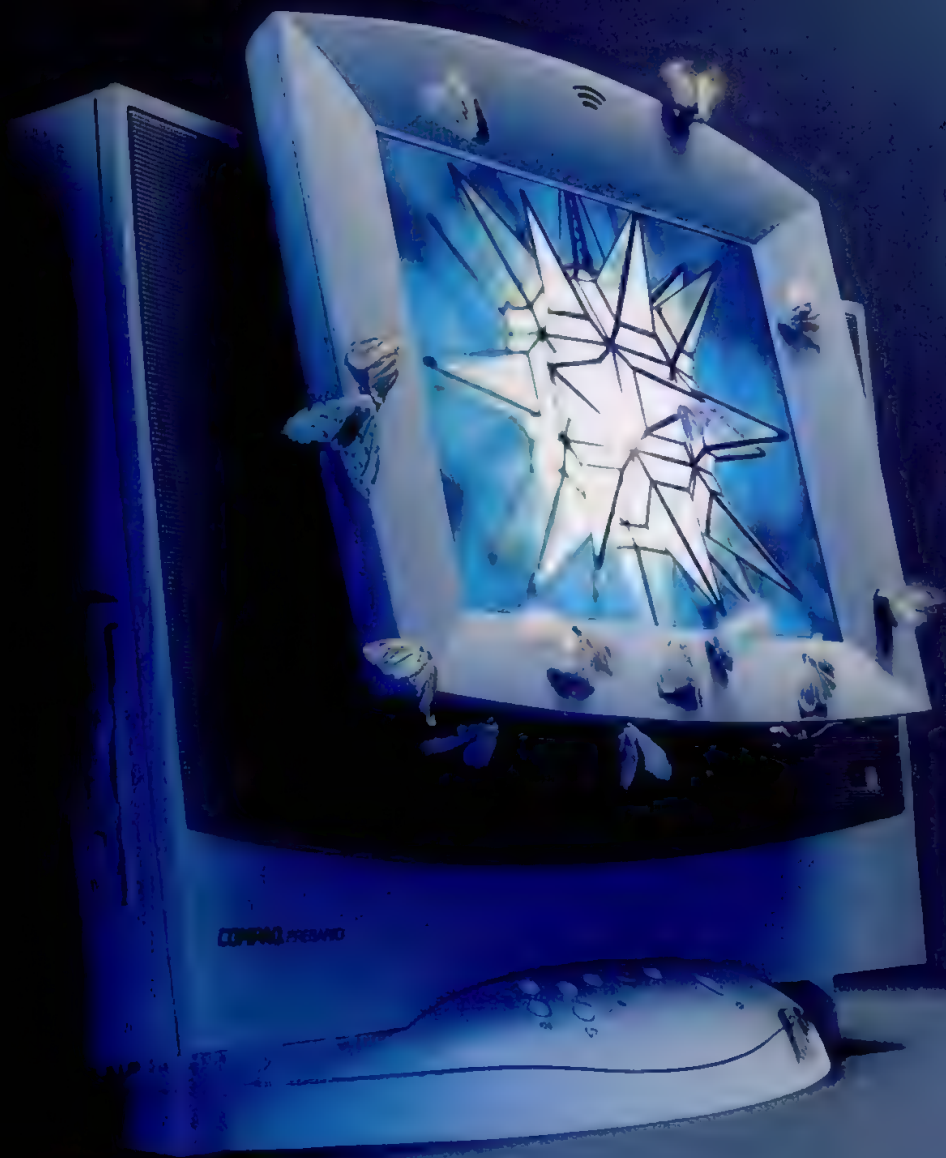


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The Compaq Presario 3000 Series has been getting quite a lot of attention lately. After all, it looks and acts totally unlike other personal computers.

Why? Well, for one, the Presario 3000 Series is among the very first home computers expressly designed for the home. Its revolutionary double-bright flat-panel display, for instance, is integrated with the PC so the two exist as one. The result is a computer that takes up 40% less space than other personal computers. What's more, its elegant design means it's perfect for any room in the house.

The Presario 3000 Series also includes a host of innovations all designed to raise your home computing experience to a new level. Things like a wireless mouse, a 4-Disc Autoload CD changer, JBL Pro speakers for true, high-fidelity sound, Easy Access Buttons at your fingertips to instantly launch your

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Computer Viruses: Myth vs. Reality

You've seen the ads. You've read the headlines. "Computer Virus to Strike Millions of Machines Today!" "Save Your PC from Fatal Infection!" Every several months, there's a massive panic as rumors circulate of a new virus or a virus with a trigger date.

This mania came into focus for me a couple of weeks ago when I got home from a business trip and found Post-Its on the monitors of both of our family computers: "Computer Virus! Don't Turn On Today!" My wife, hearing the news on television, had put the notes there so that our kids wouldn't turn on the machines until I got home and ensured everything was OK. The big threat that was supposed to wipe out our hard disks was the Hare (as in Krishna) virus, set to go off on a specific day in September and again in October. Needless to say, it didn't happen. Neither of our machines was affected, and neither was my notebook. Neither were the millions of other machines across the country.

In fact, I've never had a virus on any of my systems, although my virus detection software has found a few on floppies that I've gotten, and I came close to opening a Word document from Microsoft's PR agency, Waggener Edstrom, that was infected with the Word macro virus. (One unlucky *PC Magazine* editor got the macro virus three times from Waggener Edstrom.)

Am I exceptional or just lucky? Neither. The incidence of virus infection is simply far lower than what's claimed in the general press—and even in the less technical of the computer presses, which are fed, of course, by the PR departments of antivirus software companies. I'm not claiming that viruses are a hoax or that we shouldn't be concerned about them. A virulent outbreak can be difficult to eradicate, and expensive in terms of effort and lost productivity.

But how about the lost productivity at the Machrone household due to the Hare dustup? Okay, my son didn't get to play Quake and my daughter didn't get to check in with her online friends. If my wife had any newsletters or flyers to work on, they didn't get done that day—not exactly a big blow to the GNP. But how about the thousands, perhaps even millions of users who called their IS departments, local computer stores, tech-support lines, VARs, or their friend Bill, all in search of some assurance that it was OK to fire up the machine? The lost productivity and hours mount rapidly—on both sides of the phone line.

Fortunately, the Hare virus, like 1992's Michelangelo virus scare, was more hype than reality. But both sold a lot of antivirus software. Most of our systems have antivirus software today as a result. The majority of users, however, have little or no idea where viruses actually come from, how

detection and eradication work, and most important, what the vectors are for spreading viruses. Many still fear the Internet, bulletin boards, and online services as hotbeds of pestilence just waiting to infect their systems. Many people still avoid shareware for that reason. I've been downloading files for more than 15 years, and not only have I never gotten an infected file from shareware, I don't know anyone who has, either. The vast majority of virus infections have come from the disks that come from software manufacturers. Shared floppy disks or software that have been returned to retailers who re-shrink-wrap them are the other major source.

But what about those mail viruses? If you have an e-mail account, you more than likely got a warning (or perhaps a dozen or more, as I did) about the "Good Times" virus. Supposedly you would get a message with "Good Times" in the header. If you so much as opened the file, it would erase your hard disk. Never mind the relative impossibility of encoding such a virus into a mail message that could be opened by a CompuServe viewer, an America Online viewer, Windows' Terminal program, and all browsers. Never mind the fact that none of these

helpful warnings ever mentioned which platform was the target (since viruses are, until someone writes a good Java virus, platform-dependent). In this case, the warning was the virus. Countless megabytes of storage space were lost to this inane message. Mail systems choked on the sheer volume of messages. And nobody ever saw the Good Times virus. It was a hoax, plain and simple.

To learn more about these and other virus issues, be sure to visit Rob Rosenberger's Computer Virus Myths home page, at www.kumite.com/myths. Rosenberger is a shareware author who has made the debunking of computer-virus hype a personal cause. □



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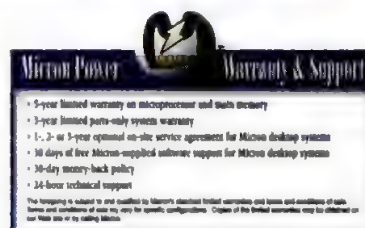
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Driving Lessons from the PC

One of the least understood aspects of computing is the use of simulations as learning tools. Let me tell you an interesting tale about my oldest son, Aric. Although Aric had never driven a car, once he got his learner's permit he jumped in the driver's seat

and drove like a pro. Now, even though just a teenager, he is one of the best drivers with whom I've ever ridden. How did this happen? I attribute it directly to his involvement with driving-simulation games for the PC, such as Spectrum HoloByte's *Vette!*, which he played for hours on end.

When you think about it, this relationship should be obvious. After all, commercial jet pilots are trained on simulators. Until recently, these commercial simulators had graphics that were no better than anything I could get on my PC. Yet the pilots learned to fly. I've discussed this phenomenon with various pilots and many believe that the better PC-based flight simulators have actually improved their flying skills.

When I interviewed race-car driver Al Unser, Jr., for my radio show, "Real Computing," we discussed this phenomenon. He told me he used to spend huge amounts of time at the arcade practicing racing. There was no doubt that these simulators improved his racing skills, he affirmed. Unser also said that younger race-car drivers coming up the ranks are even better, because the simulators they drive in arcades are more interactive. As anyone who frequents these establishments knows, you can sometimes race against several others in the same game.

Recently, I interviewed an executive at a company that makes high-end simulations and learned that the U.S. Army Tank Corps only began to win world championships after the company introduced simulators to the Army. Not only do the simulators provide lots of virtual experience, driving a simulator is a lot cheaper than driving a tank and firing real shells.

For years, various business schools have been experimenting with using computers to create virtual corporations and then using carefully designed algorithms to simulate situations in which CEOs-in-training must make snap decisions. The business thrives or goes broke, and the executives learn valuable lessons.

These are just a few examples of how computer simulations actually teach people real-world tasks, yet these simulations are often trivialized. To my knowledge, no one has

ever seriously proposed using a computer game to teach driving skills. Where are the programs designed specifically for that purpose? Sure, *Vette!* worked for Aric, but I'm not sure mowing down pedestrians is the ideal training. If he ever decides to become a homicidal maniac, I'm worried he could wipe out most of San Francisco.

In the meantime, I've decided to go one step further with my 11-year-old son, J.C. I bought him a ThrustMaster T-2 driving kit (www.thrustmaster.com; 503-615-3200), which consists of a steering wheel, a stick shift, and two foot pedals. It interfaces with most driving games perfectly. The device costs \$180, and I'm convinced it will teach J.C. the coordination skills needed to become a good driver. He was enthusiastic about the idea and even said he would drive many of the races at "normal" speeds to learn how to become a safe driver, not just a good racer. ThrustMaster also has a \$100 steering wheel, the GP 1, for those on a tight budget. I can't recommend these products enough. Even if you don't have a steering wheel, I suspect using a joystick offers similar advantages in terms of developing motor skills and coordination. Pilots often use both (depending on the aircraft), and in the late 1950s, Chrysler experimented with a joystick-controlled car.

Of course, all of this is empirical. Where are the studies regarding simulation games? If teenagers can be successfully trained to drive cars on PCs,

then why don't schools employ the same concept? Most good computer games, even if not simulators, probably have a similar beneficial impact. Improved problem-solving comes to mind. Yet most games are considered a waste of time. But in actuality, good games are anything but time-wasting. While surely entertaining, these simulators are actually educational software in the purest sense. It's time they were exploited as educational tools.

Let's start with real driving programs customized for state driving laws. Although my oldest son is a great driver, he did poorly on the written test and had to take it twice. Apparently, the rules of the road weren't an important part of *Vette!*



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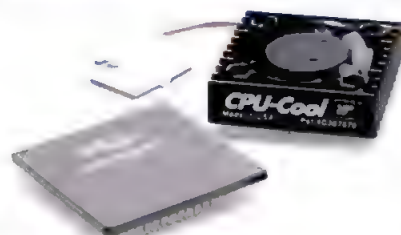
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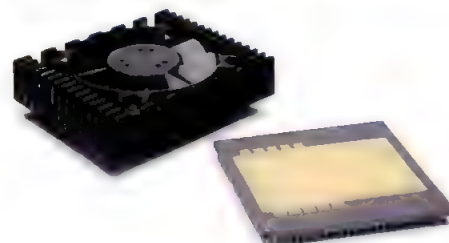
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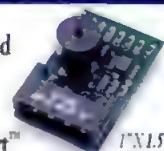
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Inside Track

Comdex Watch Dept.: If nothing else, this year's Comdex will emphasize the **emerging trend** toward digital photography that was already highlighted at a recent Seybold conference. The main change affecting the average user is that you'll soon think seriously about adding a **new peripheral** to your machine: a PC Card reader. A good example of this product is Microtech International's Digital Photo Album (800-626-4276). Priced at around \$350, you can slip any PCMCIA card into it. Windows Plug and Play will (nine times out of ten, at least) recognize the device and install it **on the fly**. This device will be necessary for using most digital cameras.

Although today's digital cameras all have a port from which you can send the photos to your PC's serial port, the process takes a minute or two per photo and is **not as reliable** as it should be. Once Kodak began using a Sun Disk PC Card in its cameras, the methodology of the future became obvious. You slip the Sun Disk out of the camera and into your PC Card reader—which shows up as the D: drive (or whatever)—and the photos are available for **quick transfer**. The cool thing about having a PC Card reader in your desktop machine is that in an **emergency**, you can insert a PC Card modem or network card into the device. A PC Card reader can also be used for massive data transfer to and from your notebook. You can move files of 5MB and larger intact. So expect to get one of these units for your computer soon.

Back to Cameras Dept.: So I've seen a lot of the new cameras coming on the market. A couple of players to watch are **Olympus and Nikon**. Olympus is rolling out digital versions of its popular Stylus cameras. Larger than the Stylus, these cameras are still **pocket-size** and will come in two models. One takes 649-by-480 full-color shots, and the other can handle an impressive 1,024-by-768 full-color format. Both will be priced well below \$1,000. Nikon is taking a different tack with the **neocamera design** pioneered by JVC and others. The neocamera does more than just take pictures—it also records digital audio and makes video clips. Nikon takes the idea even a step further. On the back of its unit is a color LCD that's also a touch-sensitive screen on which you can **write notes or annotate photos**. You can also use this small unit to create slide shows.

It will be interesting to see how these two kinds of cameras evolve over the next 12 months. I believe by this time next year the direction of digital photography will be well established. Meanwhile, Olympus and Nikon are also engaged in finding ways for people to store their photos. Olympus has just brought out a **cool-looking**, 230MB, 3.5-inch optical drive to replace the large clunker it was selling before.

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The new device is about \$350 and the company gives you 1GB of free optical disks with the purchase. Nikon, always covering the high end, is showing a 2.6GB, 5.5-inch high-speed optical drive that, it seems to me, will have lots of uses in addition to image storage.

The ultra-low-end of the digital photography market is still the \$199 Snappy, from Play Inc., which just released Version 2.0 of its software. The Snappy is actually a hi-res video-capture tool that utilizes a camcorder or video source to make images. Play Inc. will be at Comdex, showing off its real product agenda to the computer crowd for the first time: **the Trinity broadcast video system**. There are things this system can do that even Silicon Graphics machines can't do, such as **real-**

time rendering and ray-tracing. It's phenomenal. If you're going to Comdex, make sure you see this thing. It includes an unusual paint program and a character generator that, besides broadcast use, has numerous Web page design functions that would make for **killer pages**.

The final piece of the digital photography puzzle is printing. Color printers are dominating the market as people look to print Web pages in color. But few of these printers can do a decent job of printing a color photo (although what you can get from an Epson Stylus, say, is phenomenal). But new printers to be shown at Comdex include a rather unusual **photo-realistic printer, from ALPS**, that uses a slightly different technology to produce incredible photographs—some of the best I've seen, short of those from dye sublimation devices, which are too slow anyhow and use expensive supplies. The ALPS will be about \$500. The ultracool thing about the ALPS is the inks, which seem to be **fade-proof**. Best I've seen. HP is also showing a new home printer with special cartridges you put in specifically to print photos. There is no doubt that photo-realistic printers are here to stay.

Printer market shakeout: The problem with photo-realistic printers is speed. These new ones take about a full minute to print a sheet. Most color printers spend the majority of their time printing documents and Web pages. One page per minute is just too slow for general use. Laser printers are still too expensive for the average desktop computer user and are mostly used on networks. One printer approaching mass-market everyday use for high-speed color is the distinctive Tektronix 350 Phaser, which is designed like an offset press. The coolest thing about this printer—besides its outstanding color capability—is a new offer from the company: **free black ink for the life of the printer**. I hope Tektronix has a lot of black ink in its warehouse, because this deal seems **too good to be true**. Contact Tektronix (800-835-9433) for more details. □

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*Independent cross-country battery testing conducted by VeriTest, Inc., June 1996.

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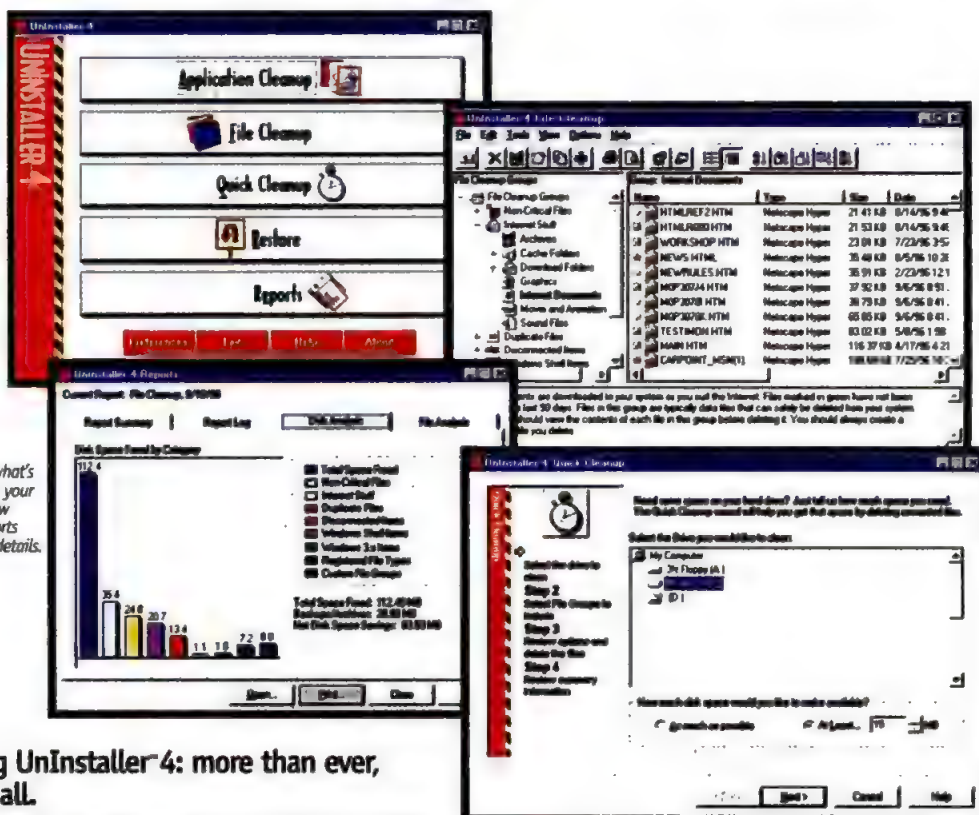
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Help Me, Doc! I've Got This Mouse . . .

Every couple of years or so, I fall victim to another outbreak of Pointing Device Discontent. To judge from your letters, I'm not alone. I haven't seen anything yet in the *New England Journal of Medicine* or the *Journal of the American Medical Association* about

PDD, so we may have a chance to make some history here. As you know, the symptoms are insidious. They creep up on you. Maybe you start eyeing a touch pad or pointing stick you've spotted on someone else's notebook, or maybe you've noticed a sleek trackball on a colleague's desk; maybe your mouse has a little dirt in it and starts skipping—you do know that the ball sticking out of the underside of a mouse has to be removed and cleaned occasionally, don't you?—and you begin to wonder if there isn't a better way.

When I recognize the symptoms coming on, I head straight to the nearest CompUSA and lose myself for a couple of hours in the goofy world of PC pointing devices. I borrow samples of the most interesting new mousers from their manufacturers and, for the next couple of months, swap frequently among them. This past summer, I worked through 11 new and semi-new mice, near-mice, and sorta-mice, convinced I'd find something better than the dull old Microsoft dogleg mouse I've been using for the past few years. I did, and I didn't. If you're a fellow PDD sufferer, you may find my journey interesting.

I particularly wanted to find a keyboard with a good integral touch pad—preferably a wireless keyboard that uses RF (radio frequency) instead of infrared (IR) controls. I love to sit back from my desk with the keyboard across my lap. But doing that's gotten a lot harder now that we rely on Windows: You have to have the pointing device in the keyboard, too. Reaching over to the desktop for a mouse all the time is loony. And dragging cables behind a lap-borne device is hopeless; a really usable combo keyboard/pointer has to be cable-free, or it and I are not going to get along for very long.

I want a device that uses RF waves instead of IR beams because of the aiming problem. When I sit back with the keyboard lying crooked across my crossed legs, it's way too far off a straight line to a desktop IR receiver. I can twist and wiggle so the two line up—but the next time I recross my legs or lean back a little, the IR beam

shoots off into space again. By contrast, RF devices broadcast a weak, nondirectional radio signal that can be picked up anywhere in the immediate neighborhood of the PC. Not much for security, to be sure—I doubt that RF keyboards are very popular at the Defense Intelligence Agency—but I'm not worried about spies, just lumbar pain.

To make a long and frustrating story short, I didn't find what I wanted. The new KeyTronic Lifetime series keyboards are the best I've found, but they position an otherwise very good touch pad—my favorite pointing gizmo, conceptually—at the extreme front edge of the keyboard, which is nearly the worst possible location if you're using the keyboard on your lap. I liked the touch of the Lifetime series so much I wound up buying one anyway—one of the non-pointing-device models, even though, of course, it reduces me once again to sitting upright at the computer like a grown-up.

I also liked, briefly, the nonwireless Alps GlidePoint keyboard-cum-touchpad, but it, too, positions its touch pad (which is even smaller than the Lifetime's) right at the front edge. I also had some intermittent driver problems with the GlidePoint that neither Alps nor I were able to solve.

Back in the world of sitting-up-straight-with-your-hands-on-the-desktop-the-way-you're-supposed-to, I liked Logitech's TrackMan Marble trackball, but in

the end found its broad reach uncomfortable for my hand. Other Logitech designs—especially the revamped cordless MouseMan—appealed for a while, too. I went back to the current version of the big Kensington trackballs, which I had long used and loved, but now they seem *too* big for me. My wrist started hurting. Many other designs were even more uncomfortable or didn't glide smoothly across the 3M mouse pad I've come to rely on, or else had too-stiff or too-mushy buttons.

Midway through these trials, a couple of Microsoft people came around with a preproduction sample of the new IntelliMouse. It looked just like the Microsoft dog-



POINTING ODYSSEY

I found something almost exactly like what I had—but better in ways I'd never imagined.



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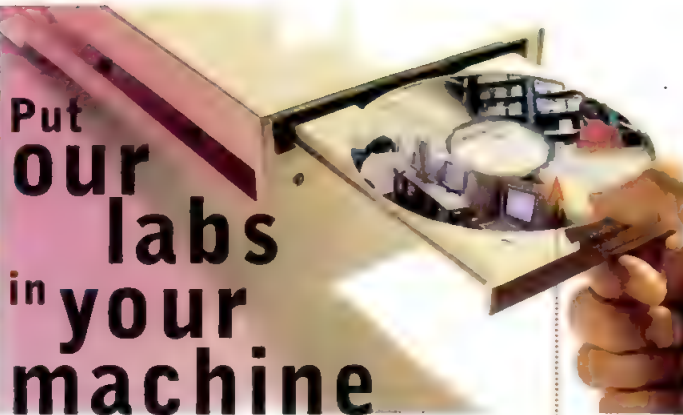
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JIM SEYMOUR

leg mouse I already had on my desk, but with a chunky little roller-wheel between the mouse buttons. We plugged it into a machine, brought up Microsoft Internet Explorer 3.0, jumped on the Web—and boy, they got me.

Those devious, scheming Microsoft people, set on world domination, have done it again. By the most foul and unfair means possible, they have connived to increase their share of the PC mouse market—a sizable chunk of change, in the hundreds of millions of dollars a year—even more. Their underhanded, anticompetitive approach? They’ve made a truly better mouse.

The new IntelliMouse lets you auto-scroll through a long text page on the Web, so you can sit back and read it without endlessly clicking to keep moving down the page. Depress the mouse button and roll the little wheel, and you can adjust the rate at which the screen scrolls by. You can do this in Word for Windows, too, but not much else: The IntelliMouse is keyed to the introduction of Microsoft’s new Office 97 suite and its apps, due around the end of the year. Other vendors can support the IntelliMouse, and I’m certain they will, but for now buying the IntelliMouse is buying an Office 97 and Internet Explorer accelerator. But what an accelerator!

You can do other tricks, like enlarging Word documents to see details. And you can move forward or backward through a series of Web pages by holding down the Ctrl key and rolling the little wheel. But the killer advantage of the IntelliMouse, the one that will move the boxes, is the auto-scroll feature.

So I wound up with an \$85 (street price) pointing device that, at least externally, looks much like what I had when I began my search. None of the keyboards-plus-pointers worked well for me, and among the desktop-resident pointers, several looked pretty good—until I started playing with the IntelliMouse.

There’s a lesson here, I suspect, about our innate preference for evolutionary rather than revolutionary devices, and maybe another lesson—seemingly at odds with the first—about not thinking large enough when we seek change. I was looking for something sort of like what I had but a little better. I found something almost exactly like what I had—but better in ways I’d never thought of.

I think I’ve suppressed my case of PDD for another year or so. But you don’t cure it, as doctors say, you *manage* it. Like that lumbar pain, it’ll be back. □

Pumping Up Your PC

Rocket science it isn't. If Compaq and others figured out how to clone the IBM personal computer more than a decade ago, how hard could it be to knock off the Creative Labs Sound Blaster spec? Simple, you'd think. But if you've ever been playing a game or using

an edutainment title when the sound suddenly stopped, you're probably suffering from an audio adapter that's not entirely Sound Blaster-compatible.

Two challenges exist for sound subsystems today: Compatibility, which pretty much means being able to play games under both DOS and Windows and to use edutainment titles under Windows, and quality, which means providing sound quality sufficient for everyone but the audiophiles who dream about the day they can afford the purer sound of a tube-type audio CD player.

A revisionist sentiment is developing among some of us at *PC Magazine* when it comes to sound and the computers we use at home. With PCs, we're comfortable with a number of brands and models. Ditto for major components like monitors, printers, and graphics cards. But when it comes to audio, the short list comes down to one brand. We've found sound-compatibility problems often go away when you swap out (or disable) the old adapter and stick in a Creative Labs board. It's not that other sound adapters won't play a wide range of audio sources; it's just that you're more likely to get complete compatibility with the real thing.

For instance, our kids favored the Humongous Entertainment titles (Putt-Putt and Freddi Fish, for example), but the audio had a habit of stopping after a few minutes. And this was with a supposedly Sound Blaster-compatible audio subsystem. The PC vendor pointed the finger at Windows 95 and Humongous. (What a surprise.) But Microsoft and Humongous made a compelling case that it was the PC and its sound system. While I had some interest in getting to the bottom of the problem, my kids were more interested in getting Putt-Putt back in action, so I short-circuited the debate by dropping in the cheapest card in the Creative Labs line, the \$100 Sound Blaster 16 Value PnP (www.creativelabs.com; 800-998-1000). Putt-Putt's back, and the kids are happy once again.

That solved problem number one, compatibility. As for quality, the problem is that most PC vendors spend very little on sound adapters and speakers—only a few dollars on

each. Craig Stark, a contributor to and a former technical editor of *PC Magazine*, and a contributing editor of *Stereo Review*, says there are two issues. First, sound is analog, and most engineers in the PC industry have digital design backgrounds. The second issue is that the industry is hell-bent on

squeezing costs: "They're spending a dollar on the amplifier section," Stark says, "when you need to spend \$4 to get a good amplifier." At least by PC standards.

Here's some things you might consider doing to improve your PC's sound:

First, upgrade to a wavetable sound adapter. *Wavetable* means actual musical sounds—samples—are stored in ROM (or, in some cases, on disk). That's better than *FM synthesis*, in which sounds are, well, made-up. One good setup is the Creative Labs Sound Blaster AWE32, about \$250; it gives you both compatibility and wavetable sound. For even better sound, add a \$200 Yamaha DB50XG daughter-card with 4MB of sound samples stored in ROM. This is an add-on, not a replacement (www.yamaha.com; 800-823-6414).

Next, get a good pair of speakers. Three-piece speakers are best, because you get more bass with a subwoofer, and the satellites that sit on your desk are smaller. I've found three choices to be especially good. One of the best values we've seen recently is the \$100 Altec Lansing ACS45—a three-piece design for the price of a two-piece (800-648-6663). At the very high end, the Bose Acoustimass Multimedia is impressive, as it should be, for

\$600 (800-444-2673). But my personal favorite is Cambridge SoundWorks' \$220 SoundWorks (www.hifi.com; 800-367-4434), because of its freestanding volume control, which you can tape to your keyboard. The first models came without any volume control. Rather than redesign it, CSW added a separate volume control on a long cable. That's a kludge, but it's an elegant solution in its own way, and you can add a SoundWorks Volume Control to any sound system for \$13.

These solutions give computer users compatibility and vastly better sound. True audiophiles may wince at the idea of \$100 or \$200 speakers being high quality, but for what most of us do with a PC, they're just fine. □



THE SOUND OF PCs
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All performance tests conducted by Matrox Graphics Inc. on a Gateway P5-166 configured with Intel P5-166MHz, 16MB of EDO RAM with 256K cache. The Matrox Millennium, Number Nine Imagine 128 Series 2 were configured with 4 MB of memory using driver releases 3.12 and 2.09 respectively. The STB LightSpeed 128 was configured with 2.25 MB of memory using driver release 1.22, and could not be expanded to support 1024 x 768 @ 24-bit. Matrox Mystique, Diamond Stealth 3D 2000GL and ATI 3D XPRESSION were configured with 2 MB of memory for the PCI bus using driver releases 3.12, 4.03.00.2101 and 2.22 respectively for Windows 95. WinBench 95 1.0 tests conducted at 1024 x 768 resolution with 8-bit and 24-bit color at 75Hz refresh using large fonts under Windows 95.

CIRCLE 381 ON READER SERVICE CARD

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By Padraic Boyle

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INSIDE



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THE MANAGEABLE UPS is the latest trend in UPSs. In *Unlimited Power*, contributing editor Padraic Boyle tests five 1000-VA UPSs, paying particular attention to the management software that comes with each. He also found some neat little hardware extras, such as options slots and plug-in devices.

WEB SITE LOGGING ANALYSIS TOOLS take that mass of logging information your Web server spits out and make some sense out of it. Contributing editor Les Freed and author Ryan Tabibian take a first look at two of these packages—WebTrends and Hit List Pro.

HIT LIST PRO is a heavy-duty package that comes with its own database and can manage multiple virtual servers on a single Web site. Though much less expensive, WebTrends offers many of the same capabilities but is more appropriate for small to moderate-size Web sites (Page NE19.)

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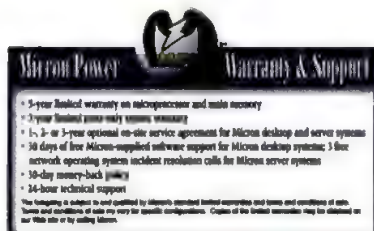
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UPSs are the bulletproof vests between the wall socket and your servers, routers, hubs, monitors, and other network equipment. Whether it's a surge, spike, brown-out or blackout, the UPS takes the bullet and makes sure the power output to the server is as close as possible to the preferred 120 volts.

UPSs come in all shapes and sizes. Some are small standalone units that attach to a server; others are mounted in a rack. The power ratings of UPSs, measured in volt-amperes (VA) range from 150 VA to as high as 500 KVA. Be aware that volt-amperes are not the same units of measurement as watts: VA factors in the inefficiencies of AC power, while watts do not. (See "How Big of a UPS Should I Buy?").

For this review we tested UPSs—each rated at between 1000 and 1050 VA—from American Power Conversion Corp., Deltec Electronics Corp., Exide Electronics Inc., Hewlett Packard Co., and Tripp Lite. One 1000-VA UPS is capable of supporting one or two servers, together with their monitors. We concentrated on UPS products that come with their own software for managing the products over the LAN. We required that each vendor provide software for networks running multiple operating systems—NetWare, Microsoft Windows NT Server, OS/2 Warp Server, and Sun Solaris.

SAFETY NET

In most cases, setting up the UPS itself is a simple process: Plug the server's or network device's power cable into one of the power receptacles on the back of the UPS, then plug the UPS's power cable into a wall outlet. To run the management software, however, you have to connect a serial cable between the server and the UPS. The serial connection lets the UPS communicate power conditions and events, such as power spikes, to the management software on the server. The UPS monitoring software receives data from the UPS and proceeds in accordance with a set of instructions—such as logging an event or sending the network manager an e-mail—that the network manager has defined.

In the event of a total power failure, the UPS monitoring software will take the additional step of alerting users on the network to save work and log off. After a defined period of time, the monitoring software shuts down the server and related files.

But a UPS can only power the server for a limited amount of time after a power outage—usually 10 to 20 minutes, depending on the VA rating and the power required to drive the attached equipment. This is just

Editors' Choice

• APC Smart UPS-1000



All of the UPS products we tested proved able to provide both the power protection your servers and network devices need and the

utilities the network manager needs to keep track of power events.

Our Editor's Choice goes to APC's Smart UPS-1000 for its inherent flexibility and excellent software. The Smart UPS-1000 comes with hot-swappable batteries, so when the battery wears out, you can save money by replacing just the battery instead of the entire UPS. And you can swap batteries without shutting down the attached network devices.

The Smart UPS-1000 was also the only product we reviewed to offer both an internal slot and a variety of interesting options to fill it. These include boards that provide remote SNMP management, UPS management via dial-up, temperature and humidity monitoring, and management of up to

three servers connected to a single UPS. Finally, the APC was a top performer on our tests, providing 50 minutes of runtime—51 minutes after a two-hour recharge—and it was the only product to indicate its charge status accurately.

We also liked the HP PowerWise 1000 UPS. At a list price of only \$519, it was the least expensive UPS we tested, yet it provides some very useful extras, such as the ability to manage UPSs attached to both Windows NT and NetWare servers from a single client.

Deltec's PowerRite Max 1000, with its unique load-shedding design, was also a strong contender. The products from Tripp Lite and Exide, while perfectly adequate, did not stand out in any way.

long enough to alert users and shut down the server. Installations that require longer periods of up time during a power crisis may need a larger UPS or a stackable solution, such as the Matrix-UPS from APC. Other options include a large battery rack—with enough batteries to support an entire server room—and a diesel generator.

We tested the battery life of each of the UPSs while they were attached to a server, a monitor, and external tape backup devices, which is not the full load these products can handle. APC's Smart UPS-1000 and Tripp Lite's SmartPro 1050 Net took top honors with 51 minutes and 53 minutes of battery runtime, respectively. The other three UPSs—Deltec's PowerRite Max 1000, Exide's Powerware Prestige 1000 and HP's PowerWise 1000 UPS—all came in at around 40 minutes. After a two hour recharge period the Smart UPS-1000, the PowerRite Max, and the PowerWise managed to regain between 30 and 31 minutes of battery recharge time, while the SmartPro and the Powerware Prestige gave us only 14 and 10 minutes, respectively. Of

the five products, only the Smart UPS-1000 appeared to display accurate charging results. Keep in mind, though, that all of these runtime figures are long enough to warn users and shut down servers.

THE BANDITS

In the United States, power companies are supposed to provide power that approaches 120 volts at 60 Hz. The power they provide often varies from this figure by plus or minus 10 percent (108 to 132 volts). Any power that fluctuates more than this 10 percent variance is called dirty power.

Some examples of dirty power are spikes, surges, sags and brown-outs. *Spikes*, or *transients*, are sometimes caused by lightning strikes and can temporarily increase the normal 120 volts to anywhere from 400 to 5,600 volts. Though the rise in voltage lasts only a brief moment (one cycle or one-sixtieth of a 60-Hz cycle), it is nonetheless dangerous. *Surges* are oversupplies of voltage that usually last less than a full cycle.

Power sags are momentary drops in incoming voltage, usually caused by a change in the load on a power system (such

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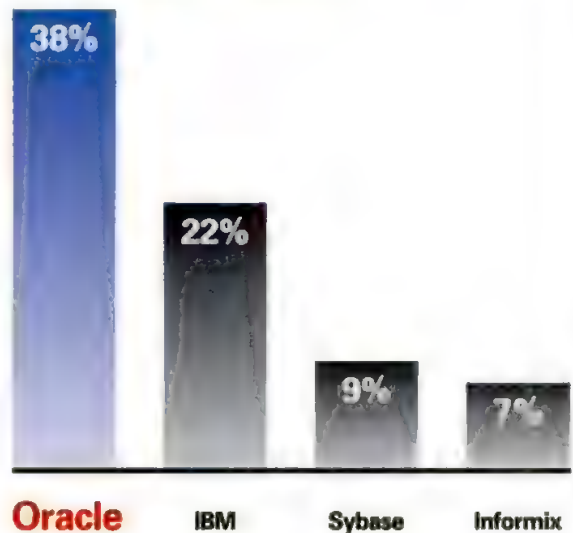
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as when an air conditioner kicks in). *Brown-outs*—longer drops in incoming voltage—are, on the other hand, more common during hot summer months in areas where power plants are overtaxed. The granddaddy of them all—the *blackout*—is a total loss of power due to a power outage.

LINE-INTERACTIVE VS. ONLINE

When it comes to dealing with these power events, UPSs fall into two categories: line-interactive and online. *Line-interactive* UPSs filter the power as it enters the UPS and again as it exits to service the server. In the event that the input power surges past 125 volts or sags below 104 volts, the line-interactive UPS either *bucks* (drops) or *boosts* (raise) the signal, to ensure proper voltage output. In a power outage situation, the UPS switches to battery mode. Switch-over time is approximately 8 ms—too short for the server to notice. UPSs from APC, Deltec and Tripp Lite all fall into the line-interactive category.

On-line UPSs use their batteries and DC inverters to supply a constant 120 volts to the server. They don't bother with incoming voltage unless it drops below 95 volts, at which point they switch over totally to battery power. The power that comes into the UPS from the power company is used mainly to keep the battery at full charge. If a power outage occurs, there is no switch-over time, since the UPS is already running equipment with its own battery. Online UPSs are generally more expensive than line-interactives. One exception to this rule is HP's PowerWise 1000, which, at \$519, costs less than some of the line-interactive UPSs reviewed here. The Powerware Prestige is also an online UPS. There is a lot of debate about which method is superior, but both accomplished the same task and neither proved superior in our testing.

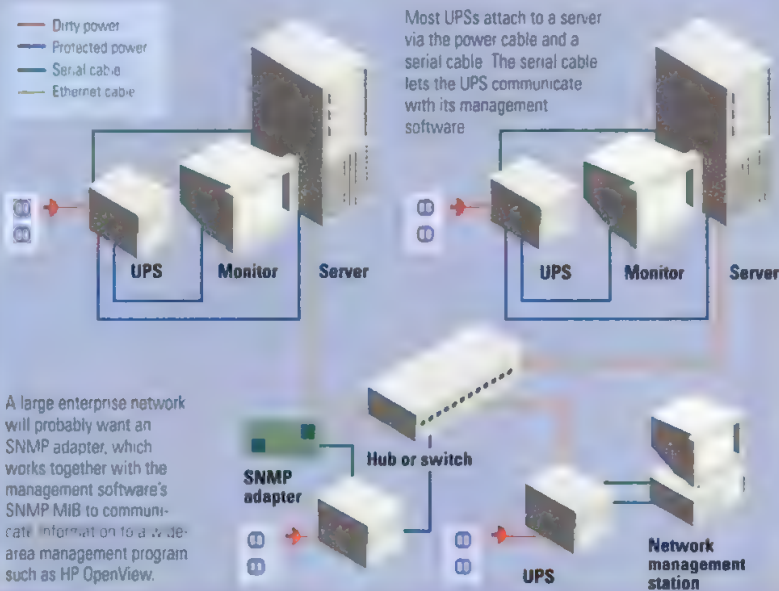
OTHER FEATURES

We found all of the management packages we tested to be pretty simple to set up and use. All let you configure the software to alert the network manager to power events by either a page or an alert over the network. Only one product, the SmartPro 1050 Net came with software that did not provide e-mail alerts. All the packages also offer graphical meters that depict the operating status of the UPS's input power and load information, and all can keep a history log of various power events.

In addition to local management of UPSs, all the products we tested offer or soon plan to offer hardware and software for managing the devices remotely using an

Maximum Power Protection

To prevent the loss of important data during a power outage, attach an uninterruptible power supply (UPS) to all your servers and network devices, including hubs, switches, routers, and NT-1 adapters



SNMP (Simple Network Management Protocol) manager such as HP OpenView. Some vendors—APC and HP, for example—offer a plug-in application for HP OpenView that provides additional wide-area management capabilities, similar to those offered by the local management software. By contrast, Tripp Lite, Exide and Deltec provide only such standard SNMP trap information as whether the UPS is using utility or battery power. Setting up an SNMP management system solely to manage your UPSs is overkill, and we recommend it only if you're already using SNMP to manage your other network devices.

Other features in the spotlight are hot-swappable batteries and option slots. Hot-swappable batteries, offered by APC and Deltec, let you save some money, because you don't have to replace the entire unit when the battery wears out. And the battery can be replaced without shutting down the server.

Option slots are used to install additional features, such as humidity and temperature monitoring, multiple server support and SNMP adapters. These slots are useful for adding more value to the UPS as a protective device. Only APC offers an array of choices for its option slot. HP offers—and Deltec will soon offer—an SNMP adapter.

All of the UPSs we tested will suffice in a power emergency. Don't be caught without one.

American Power Conversion Corp.

Smart UPS-1000



With support for a variety of network and server installations, hot-swappable batteries, and a handy SmartSlot feature for adding enhanced monitoring capabilities, American Power Conversion's line-interactive Smart UPS-1000

(\$699 list) was the most flexible product we tested. It also had the second-highest battery runtime at 51 minutes—30 minutes after a 2-hour charge. A longtime player in the UPS market, APC has several lines of UPS, including rack-mountable and stackable solutions.

The Smart UPS-1000 houses six power receptacles. It offers superb management software for nearly every network operating system on the market. In the event of power surges or dips, the Smart UPS-1000 bucks or boosts in order to maintain voltage in the 120-volt range. Hot-swappable battery replacement enables even the average user to replace the battery without downing the server or other supported devices. To remove the battery, you simply pop off the front panel, unscrew a metal plate underneath, disconnect the battery terminals, and slide the battery out. Deltec's PowerRite Max

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	FE-600	6	0
	FE-200TF	2	0
	FE-200TT	2	0
10/100 SEGMENT SWITCHING	FE-512	5	12
	FE-506	5	6
	FE-210	2	10
	FE-106	1	6
	FE-105	1	5
	FE-101	1	1
10/100 DESKTOP SWITCHING	FE-224c	2	24



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- FE-224c** a hybrid switch that delivers cost-effective migration for 10Base-T users; supports high-speed access to local servers.
- FE-200TF** a two-port switch that extends the distance between 100Base-T segments to build affordable large networks.
- FE-105** simple and easy entry into 10/100 switching for small businesses, workgroups or power users.

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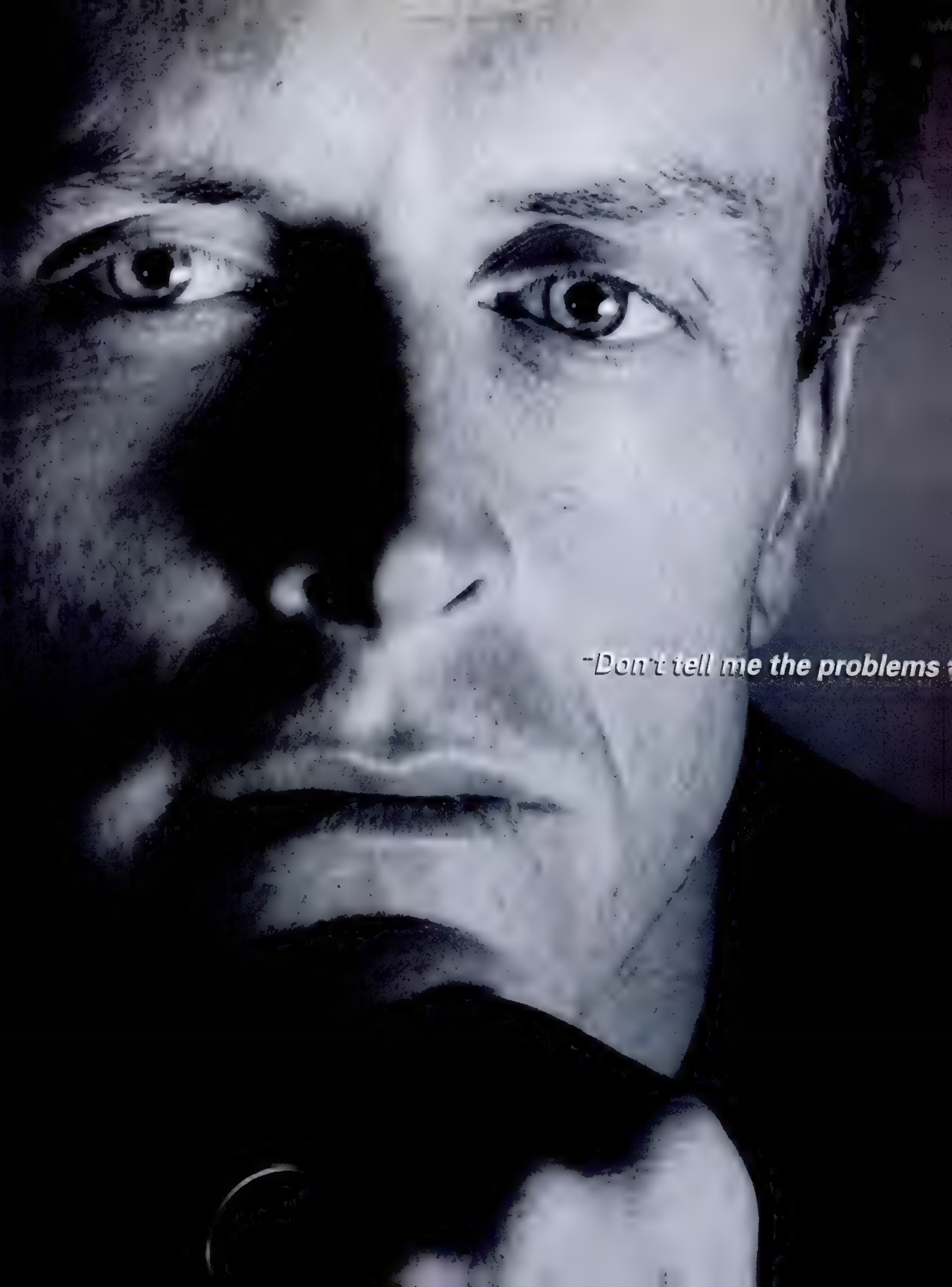


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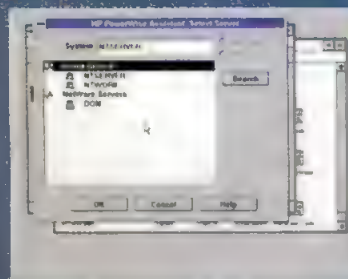
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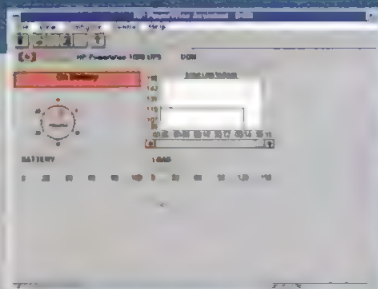
NETWORK EDITION

COVER STORY

THUMBS UP!



HP's PowerWise Assistant software lets you manage both NetWare and Windows NT servers from a single management client.

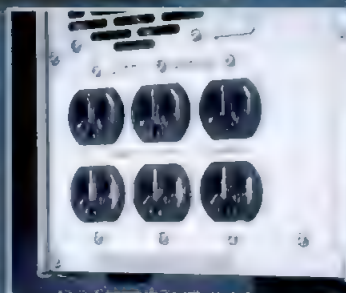


Deltec's PowerRite Max 1000 provides two power-receptacle grids—one with two receptacles and one with four—and lets you shut one of them down to increase battery runtime for the other.

Another nice feature of PowerWise Assistant is an algorithm that automatically calculates how long based on the current load the battery will last during a power outage.



The APC Smart UPS-1000 and Deltec PowerRite Max 1000 feature hot-swappable batteries, so you don't have to shut down the server to replace the battery.



1000 was the only other UPS in our roundup to offer hot-swap capabilities.

Installing Smart UPS-1000 consisted of plugging it into the wall outlet and connecting the server, monitor, and other components to the power receptacles. We loaded APC's PowerChute plus software onto the protected server and enabled settings for alerting and scheduled power-shutdown functions. Like the



APC's Smart UPS-1000.

other products in this roundup, the UPS communicates with the software on the server through a serial cable.

You can configure PowerChute plus to alert you via e-mail or paging to such power emergencies as spikes, dips, and blackouts. To do so you simply click on the appropriate choices displayed on a single configuration screen and fill in the information in the resulting dialogue

boxes. The software also provides statistical information on these events and creates a log for diagnostic purposes. In addition, the software lets you execute external programs to shut down databases and other active applications.

PowerChute plus displays graphical gauges of the power status, load, and overall battery health. It also offers diagnostic controls to test the UPS's charge.

To manage the Smart UPS-1000 via SNMP, you need an optional adapter (\$399), which fits into the SmartSlot, and PowerNet SNMP software (bundled with the Smart UPS-1000 for an extra \$70 or sold separately for \$169). PowerNet SNMP Manager works as a plug-in with HP OpenView for Unix, HP OpenView for DOS, IBM NetView for AIX, and Novell ManageWise platforms. Under each platform, PowerNet SNMP Manager launches and provides graphical and menu-driven management of the APC UPSs on the network.

APC offers other adapters for the SmartSlot that provide remote UPS management via dial-up (\$159 list), temperature/humidity monitoring (\$199 list), and management of as many as three servers connected to a single UPS (\$149).

Smart UPS-1000. List price: \$699. American Power Conversion Corp., West Kingston, RI; 800-877-4080, 401-789-5735; fax, 401-789-3710; www.apcc.com. *Circle 951 on reader service card.*

Deltec Electronics Corp.

PowerRite Max 1000

With a unique hardware design, 10-year prorated warranty, hot-swappable batteries, and above-average management software, the Deltec Electronics' PowerRite Max 1000 interactive UPS (\$649; \$589 without software) was one our favorite products.

The PowerRite comes with six power receptacles broken up into a grid design that separates four receptacles from the other two. The design—which Deltec calls load shedding—lets you increase battery runtime by shutting down the grids separately.

The PowerRite has an options slot on the back, but option boards were not shipping at the time of this review. Optional SNMP boards are expected to be available by the time you read this. In addition, the product has a network and phone-line surge suppresser feature. The PowerRite's battery is hot-swappable.

The PowerRite ships with two software packages: LanSafe III, intended for servers and clients connected to the network; and FailSafe III, for standalone PCs. With both programs, it's easy to customize alerts to execute remote notification via e-mail, external command, or pager in response to such power problems as blackouts and surges. A test feature is available to check the alert features. And you can configure preventive maintenance schedules to test the health of

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We attached each vendor's UPS to the HP

Our first test was a Full Charge test to determine the amount of time the UPS alone would maintain power to the server, monitor, and tape drive after a full charge. Secondly, we fully discharged each UPS and allowed each to recharge for 2 hours. We then disabled power to the UPS from the outlet and recorded its runtime under the load described above. During the 2-Hour tests, we disabled the automatic

Diagram illustrating a test-bed for manageable UPSs. The setup includes:

- Monitoring workstation** (HP Vectra P90) connected to the **UPS** via a **Serial connection**.
- UPS** (HP NetServer 5/66 LF) connected to the **Server** via **Power connections**.
- Server** components: **Monitor**, **Tape drive**, and **Tower box**.
- Wall outlet** connections: Two wall outlets are connected to the UPS via power lines.
- Legend:**
 - Red line: To power
 - Blue line: To ground

TEST-BED: Manageable UPSs.

UPS load



the UPS and its battery from time to time.

LanSafe provides two graphical screens for viewing the current status of the UPS. One screen uses color bars, but because there is little contrast between actual readings and danger levels, we found them difficult to read. The other screen provides a nifty map of the internal workings of the UPS and shows the flow of power through the unit itself—nice to look at, but the information wasn't particularly helpful. A series of event logs record the time, date, and descriptions of power events as they occur.

LanSafe's proprietary SafetyNet technology shuts down a user-defined group of servers and clients in the event of a power failure. If an unattended client has databases open and the server power fails, SafetyNet springs into action and shuts down the client, then the server. This helps guard against the loss of important files. HP offers a similar feature.

but it works only on NetWare servers.

Deltac claims it's Advanced Battery Management (ABM) feature doubles the PowerRite's battery life. It uses a three-step charging process that consists of a rapid charge, a trickle charge, and rest. On our tests, the PowerRite had a healthy battery life of 40 minutes—31 minutes after a 2-hour recharge—but it was surpassed by the SmartPro and the Smart UPS-1000. ABM also monitors the battery's health and sends an alert informing you when the battery needs to be re-

PowerRite Max 1000. List price: \$649; without software, \$589. Deltec Electronics Corp., San Diego; 800-335-8321, 619-291-4211; fax, 619-296-8039; www.deltecpower.com. **Circle 952** on reader service card.

Exide Electronics Inc.

Powerware Prestige 1000

A good choice for Unix-based networks, the Exide Electronics' Powerware Prestige 1000 (\$889) is a capable online UPS. Its power management tools run on many different flavors of Unix as well as on Microsoft Windows NT. The included version of the OnliNet power management software we tested did not run on NetWare, but a version that should be available by the time you read this will. And though at 10

minutes the Powerware's runtime after a 2-hour recharge was the lowest of the bunch on our tests, it was perfectly adequate. Runtime on a full charge was 39 minutes.



Exide Electronics' Powerware Prestige 1000.

The Powerware Prestige has four power receptacles on the back panel. Since it's an online UPS, it's capable of handling a wide range of voltage variances without switching completely to battery. Unlike the APC and Deltec products, the Powerware Prestige's battery is not hot-swappable. Exide does, however, provide a separate unit called PowerPass (\$149), which plugs into the back of the UPS, encompassing all four receptacles; it sits between the UPS and the server. The PowerPass is capable of providing power and surge suppression to the server while the UPS is being replaced. The PowerPass itself provides seven receptacles, six

SUMMARY OF FEATURES

Manageable UPSs

PC MAGAZINE
NETWORK EDITION
EDITORS' CHOICE

	American Power Conversion Corp. Smart UPS-1000	Deltec Electronics Corp. PowerRite Max 1000	Exide Electronics Inc. Powerware Prestige 1000	Hewlett-Packard Co. HP PowerWise 1000 UPS	Tripp Lite SmartPro 1050 Net
■ YES ■ NO					
In alphabetical order by company					
List price	\$788	\$589	\$889	\$519	\$659
Hardware					
Type of power supply	Line-interactive	Line-interactive	Online	Online	Line-interactive
Number of receptacles	6	6	4	4	6
Hot-swappable battery	■	■	■	■	■
Load shedding	■	■	■	■	■
Phone-line-port/network-port surge protection	■ ■	■ ■	■ ■	■ ■	■ ■
Accessory slot	■	■	■	■	■
Software					
Alerts via e-mail/paging/screen	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Remote monitoring	■	■	■	■	■
Temperature monitoring	■	■	■	■	■
Schedules server power-down/self-test	■ ■	■ ■	■ ■	■ ■	■ ■
Executes external batch programs during blackouts	■	■	■	■	■

of which are for power protection; one is for surge protection only.

At the time of testing, Exide offered two different management software packages. For Unix and Windows NT environments, there was OnliNet, which costs an extra \$99. Version 3.x works under SCO Unix, NCR SVR4, HP-UX, Digital Unix, Apple A/UX, and, Windows NT Server 3.51 for x86 and Alpha chips. It does not support NetWare, but Exide says that Version 4.x—shipping this November—will. Exide shipped us a copy of LanSafe from Deltec, also in this roundup, which works with NetWare.

The OnliNet management software gives a real-time graphical display of the power status, load, and battery charge status. It's relatively easy to configure alarms for sending e-mail, pages, and text messages or for executing external programs when a power event occurs.

Like Tripp Lite, Exide offers Connect-UPS (\$399 for thin or thick Ethernet), an external Ethernet adapter that adds SNMP management capabilities to the Powerware Prestige. A Token-Ring version is also available for \$799. OnliNet comes with a set of SNMP MIBs.

Powerware Prestige 1000. List price: \$889. Exide Electronics Inc., Raleigh, NC; 800-554-3448, 919-872-3020; fax, 919-870-3450; www.exide.com. Circle 953 on reader service card.

Hewlett-Packard Co.

HP PowerWise 1000 UPS

The HP PowerWise 1000 UPS (\$519) was the only unit we tested whose included software lets you manage all the UPSs in a mixed Microsoft Windows NT and NetWare environment from a single remote console. Another nice feature of the product is a slot that can hold an optional SNMP adapter for wide-area management. Unlike with APC's Smart-UPS 1000, however, the SNMP card is the only option available for the slot. The unit's internal batteries are not hot-swappable, but you can purchase external hot-swappable batteries (\$249). Battery run-times were 38 minutes, and 31 minutes after a 2-hour recharge.

As with the other UPSs, installation of the PowerWise consists of plugging the power cable into a wall outlet and connecting the power cables from your various devices to the unit's four power receptacles. You also have to connect a serial cable between the UPS's monitoring port and the protected server's communications port. PowerWise Assistant for NetWare 3.12 and 4.x, and Windows NT Workstation and Server 3.51 is bundled free. Optional packages are available for OS/2 Warp Server 3.0 (\$99), SCO OpenServer 5.0 (\$149), and Sun Solaris 2.2

through 2.4 (\$199). At press time, HP had just announced Web Assistant, a Web-based management tool that will come with the PowerWise and operate across any platform.

PowerWise Assistant lets you manage both NetWare and Windows NT servers from a single management client, giving you the best of both NOSs without having to manage two separate platforms.

From the PowerWise console you can configure the software's handling of specific power events, such as blackouts, via a series of pull-down menus and dialog boxes. A nice feature of PowerWise Assistant is an algorithm that automatically calculates how long the battery will last during a power outage based on the current load.

The software also provides easy-to-read meters that depict the current operating status of the UPS's input power and the load information, and a history log keeps track of various power events as they happen.

In addition, PowerWise Assistant is available as a plug-in for HP OpenView. Combined with the optional 10Base-T SNMP module (\$399), which fits into the slot on the rear of the unit, PowerWise Assistant can view the status of all HP UPS's from a single HP OpenView workstation.

The PowerWise's solution for supporting multiple servers is software-based. One of the attached servers is designated the main server and the others report to it.



HP PowerWise 1000 UPS.

When the main server is alerted of a power failure, a message is transmitted to the other servers, initiating a graceful shutdown. But this capability is available only for NetWare installations.

HP PowerWise 1000 UPS. List price \$519. Hewlett-Packard Co., Rockaway, NJ; 800-533-1333; fax, 800-333-1917; hpcc998.external.hp.com:80/netserver/datashet/www_ups.html. Circle 954 on reader service card.

"5 tough questions to ask about UPS systems. And the answers you'll get if you ask..."

1

Aren't all UPS warranties alike?

No! Check all aspects of a warranty including the duration of coverage and length of customer guarantee. The most comprehensive warranty in the industry is offered by Deltec, with 5 and 10 year pro-rated terms, \$25,000 load protection and a 60-day no questions asked guarantee.

2

Are all UPS batteries alike?

Yes! However, all systems are not the same. One point of differentiation is the firmware that manages the UPS. One example is Deltec's Advanced Battery Management (ABM™) which uses a patented, 3-stage charger that actually doubles battery life.

3

What determines price/performance value?

Reliability, ease-of-use and most importantly, customer support. When in doubt, look to industry leaders... they're leaders for a reason. Specifically, Deltec is the documented leader when comparing price to reliability, performance and technical support.

4

How important is a broad product line?

A broad product offering ensures matching the right product to the right application. With UPS models available to protect equipment from PCs to mainframes, and an extensive selection of powerinterface software, Deltec has the most comprehensive offering in the industry.



5

Why is power management software important?

"My experience has been that protecting data is as important as safeguarding hardware. It is equally important to monitor, control and test your entire network or standalone PC. LanSafe III and FailSafe III packages for Deltec's UPSs save data throughout the network and ensure graceful shutdown during extended blackouts."



Ronald L. Pitt

Ronald L. Pitt
VP Software Development

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CIRCLE 889 ON READER SERVICE CARD

How Big a UPS Should I Buy?

By Frank J. Derfler, Jr.

The process of buying a UPS is guaranteed to make you feel insecure. You're buying insurance so you know that it's foolish to underspend, but it's also wasteful to overspend. Using science to figure out how big a UPS you need requires some arcane knowledge, so you're often at the mercy of a salesperson or consultant. Predictably you end up with something with a large safety margin. We'll help by giving you the bottom line up front: Figure 400 to 500 volt-amperes per PC/monitor combination and you'll be safe for most installations.

The sizing process is difficult, because alternating current (AC) power has some weird properties. It's great for resistive loads, such as light bulbs, but when it encounters PC and monitor power supplies that have a lot of capacitance and inductance, AC power loses efficiency. This loss of efficiency is called a power factor (PF) and PCs have a power factor of about 0.6.

UPS vendors generally rate their products in volt-amperes (VA), a measure that includes the power factor. But PC vendors rate their systems in either amps or watts, measurements that assume a perfect PF. If the plate on the back of the PC or monitor lists the consumption in amps, then multiply the amps times the volts (typically 120 in North America); then multiply that figure by 1.6 to get the VA rating. If the consumption is in watts, simply multiply that number by 1.6.

Two caveats: First, the rating you want is not the power supply rating that you might find in a computer's spec sheet. The spec sheet lists how much the power supply puts out, but

a computer generally consumes more than that because of internal inefficiencies. Second, powering a laser printer from a UPS is generally not a good practice because of the power used by printer's heating elements. There are exceptions for specific products, but that's the rule of thumb.

So what do you do if you can't find a power rating on your PC? It happens. We used a digital wattmeter to measure some PCs and monitors we had sitting on lab benches. A group of Pentium computers from HP and Micron—all with 32 megs of memory and more than a gig of hard drive—drew an average of 90 to 100 watts from the wall plug. Monitors from HP, NEC, and ViewSonic in the 17-to-21-inch class drew almost exactly the same wattage. Modems used about ten watts. By adjusting 210 watts for a 0.6 PF, we concluded that we would need a UPS with a minimum VA rating of about 336. So, it's no coincidence that so many UPS companies market devices rated at between 400 and 450 VA!

If you're protecting a network, here are some other factors to consider. Does every wiring hub, router, NT-1, and other WAN communications device have UPS protection? They should. Do you have to be prepared for long-term power outages? You may need a generator to pick up the load after the five minutes or so that you get from a UPS. Have you had a professional electrical engineer check for ground potential group differences between buildings connected by your copper LAN cable? Otherwise unimportant differences in building power grounds (the best argument for fiber) can cause what appear to be power or equipment problems.

Tripp Lite

SmartPro 1050 Net

If you're looking for basic UPS protection, Tripp Lite's line-interactive SmartPro 1050 Net (\$659) provides management software for most network installations. It doesn't boast the advanced features of some of the other products in our roundup. But when the power fails, the Smart Pro can send messages to end users and down the file server gracefully. Battery runtime was 53 minutes—14 minutes after a 2-hour recharge.

The SmartPro comes with six power receptacles on the back and a telephone-line suppresser. It doesn't have an option slot and the battery is not hot-swappable. But Tripp Lite offers an external SNMP adapter (starting at \$399 for Ethernet) to enhance the management capabilities of the UPS.

Installing the SmartPro was easy. Like the APC and Deltec products, the Smart Pro has buck and boost capabilities to combat a power surge or a drop in incoming voltage.

The SmartPro ships with PowerAlert Plus software for all of the major NOSs,

including Microsoft Windows NT Server 3.51; NetWare 3.x, 3.12, and 4.x; OS/2 Warp Server 3.0; and Sun Solaris 2.2 through 2.4. We were surprised to find that the installation process for the NetWare version of the software is still DOS-based and, according to Tripp Lite, will stay that way for the foreseeable future.

Using the PowerAlert Plus software, you can configure the UPS to shut down the server during a blackout and send out alert messages and paging notifications. The software can also execute external programs to close database files. Unlike the other UPS management packages reviewed, however, PowerAlert Plus does not have an e-mail alert function.

You can also configure the PowerAlert software to test the UPS or power down servers on a scheduled basis. The software keeps a log documenting power events. The software also offers color-coded bar graphs of incoming voltage, frequency, percent of remaining battery power, and temperature. Unlike APC and HP, Tripp Lite does not offer an SNMP management software module that you can plug into management programs. Tripp Lite provides an SNMP

MIB, however, that works with the external SNMP adapter. Moreover, a NetWare SNMP agent is included, which allows the UPS to be managed remotely



Tripp Lite's SmartPro 1050 Net.

without the assistance of an external SNMP adapter.

Tripp Lite offers a variety of power protection products, including rack mountable UPSs and solutions for standalone PCs or AS/400 minicomputers.

SmartPro 1050 Net. List Price \$659. Tripp Lite, Chicago; 312-755-5401, fax, 312-644-6505; www.triplite.com. Circle 955 on reader service card.

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First Looks

HANDS-ON REVIEWS OF NEW SHIPPING PRODUCTS

WEB-MONITORING SOFTWARE

The Trends of the Site Are In

By O. Ryan Tabibian

Now that we're all comfortable with the Web—Web sites, Web authoring tools, and Web servers—it's time to find out exactly what's happening on all of those sites. And there are products coming to market to help you do just that. Two of those are WebTrends from e.g. Software and Hit List Pro from Market Wave.

WebTrends is considerably less expensive than Hit List Pro, but it doesn't have the same capabilities. In addition

Quick Reports

Hit List offers many report templates.

to the lack of a database, the product also lacks many of the filtering and reporting options found in Hit List Pro. With Hit List Pro, administrators can import a log file into the database and create a report based on that particular day's traffic patterns. They can also easily create historical reports that span the entire content of the database. If you're looking for a certain trend on your site over the past two months, for example, you can easily create such a report, provided that the log files have not been purged from the database.

WebTrends is well-suited

for anybody who is either advertising or selling products on the Web, because the product allows you to pinpoint where hits are coming from geographically. If you are interested, however, in having more extensive reporting and filtering options—particularly reports on virtual servers—the analysis possibilities that Hit List Pro offers may be more appropriate.

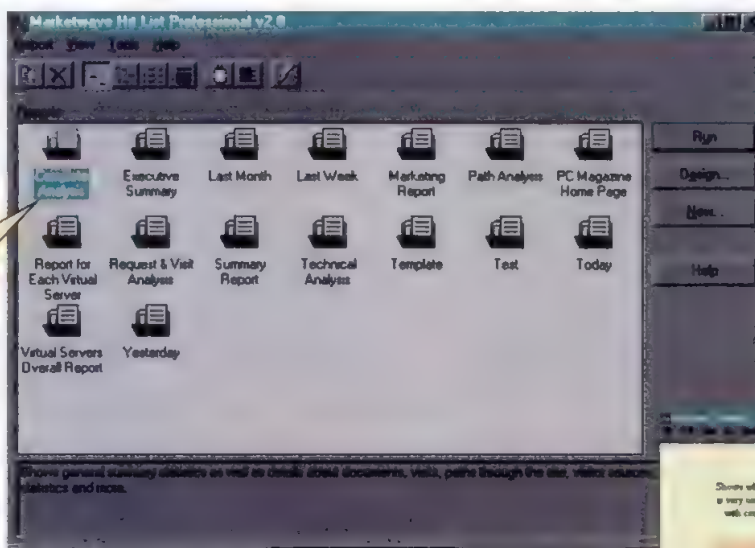
derstanding of who's been visiting your Web site and what pages have been accessed, you would have to parse through all the log files. These can span thousands of lines, making manually parsing an almost impossible task. That's where Hit List comes in.

Hit List, a Microsoft Windows 95/NT application, can parse through most log files and create comprehensive re-

file format or user agents that contain the information.

Hit List also contains a full-fledged Microsoft Access database, which can import and keep track of your log files. The program uses these imported log files to generate reports. WebTrends, on the other hand, does not maintain any kind of database and can't store the historical data as Hit List can. Because of Access's 1GB limitation, Hit List offers an ODBC driver for larger sites, which allows you to store the log files in a more robust database, such as Microsoft SQL Server. We were disappointed, however, by the lack of a viewer for the database content; the only way to view it is to use Access.

To test Hit List, we installed it on an Intel Pentium/133 PC with 32MB of RAM running Windows 95. The installation and configuration of the product was straightforward. Our test included importing and running reports on a multitude of log file formats, including Common, Combined, and Ora-



Market Wave Hit List Pro

As more companies establish a presence on the Web, CEOs want to know who's been visiting the site and if it's producing a return on the investment. Hit List Pro from Market Wave is one of a burgeoning group of products that can provide you with the answers.

All Web servers keep extensive log files, but to get an un-

ports with such information as who's been visiting your site, what pages are most commonly accessed, and the type of browser and operating system being used by each visitor. The type of information varies depending on the type of log file. To get browser and operating-system information, you need to use either a combined log

Most Popular Browsers

Shows which web browsers are most commonly used to view the site. This is very useful for sites that wish to take advantage of features available only with certain web browsers. This information is only available when logs contain USER_AGENT data.

Browser	Total Requests
Northern 2.x	1,842
Northern 1.x	471
Microsoft IE 2.x	159
CompuServe/Signy	29
IBM WebSphere	15

file. In total, we tested the product with 14 different log file formats and found that we were able to import and create reports on all our test log files.

Hit List consists of two parts: the query portion, which imports log files into the data-

NETWORK EDITION

First Looks

base; and the reporting option. To generate reports, a user first imports the log files into the internal database, then generates the report using the reporting tools. You can also easily schedule reports to run automatically at different times of day.

Myriad options are available for the reports. For instance, you can create a report that discards entries from a specific Web site. This is useful for sites that want to get a realistic traffic report by eliminating any internal company traffic. We were able to seamlessly generate historical traffic and usage reports on our Web server. WebTrends does not have this kind of capability.

Hit List also comes with several default report templates, such as a Comprehensive Report and Executive Summary templates. And we found it simple to create customized templates to fit our specific needs. For example, you can create a report that only shows the number of hits and the type of browser used.

Once your report is created, Hit List offers several options for viewing. The default option is HTML, which you can view using any standard browser. You can also export the reports in either Microsoft Word, ASCII text, or comma-delimited formats; Microsoft Excel export filters are not available at this time.

The product also has an array of features for Internet service providers (ISPs). Because most ISPs run multiple Web servers on a single host, Hit List can easily create either an aggregate report of all the Web sites and their traffic patterns or create individual reports for each server. Again, WebTrends doesn't offer this capability.

Although WebTrends is more affordable and easier to use than Hit List, it does not match the extensive set of features found in that product, es-

pecially in terms of filtering and reporting.

If you are a Web administrator looking for a product that offers an impressive set of features at a reasonable cost, you will be hard-pressed to find a better solution than Hit List Pro from Market Wave.—ORT

Hit List Pro. List price: \$1,995. Market Wave, Seattle; 800-521-8167; www.marketwave.com. Circle 969 on reader service card.

e.g. Software Inc.

WebTrends 2.0

Though true that Hit List has more—a database, more filtering and reporting options—WebTrends is one of those products we wish we'd thought of. e.g. Software's \$299 WebTrends 2.0 takes huge, boring, nearly meaningless Web server log files, filters and massages the data, and presents all of it in a crisp, understandable, graphical format.

Nearly every Web server can maintain a log of user activity. Typically, a server logs each access to each Web page. A server log may contain the IP address of the requesting party, along with the date, time, and URL requested. Some servers also log the type of browser and operating systems used by the client. All this data is stored in a file on the server. As you can imagine, the log for a busy Web server can easily build to several megabytes of data per day.

WebTrends takes your server log in any of several common Web server formats, sifts through the data, and uses it to generate re-

CROSSTALK



Frank Dorfner

“Leon, doing business on the Web is still a matter of intuition and experimentation, but these products at least provide some objective and comparative information about server usage—something to hang your hat on besides a hunch. Both products chew on Web server log files and generate reports in HTML, so that you can post them on an intranet server as evidence in support of your request for a larger budget.”

“I think WebTrends is a little friendlier and easier to use than Hit List Pro, but Hit List will really appeal to the professional who has several virtual Web servers running at each web site in an enterprise. Of course, Frank, all of these statistics still don't tell you how effective or important the transactions are, but they do allow you to measure service so you can compare it to investment.”



Leon Erlanger

ports. The reports are created as HTML documents, so you can view them with any browser. You can also use your browser to cut individual tables and graphics from the HTML documents and paste them into your word processor or spreadsheet. Because the WebTrends reports are HTML documents, you can also publish them on your Web page or on a private Web server, so you can check your serv-

er's performance from anywhere with any Web browser.

Installing WebTrends could not be easier. The program comes on two floppy disks and installs in a matter of minutes. WebTrends runs under Microsoft Windows 3.x, Windows 95, and Windows NT. No spe-

What You Need

WebTrends keeps lists of server logs for you.

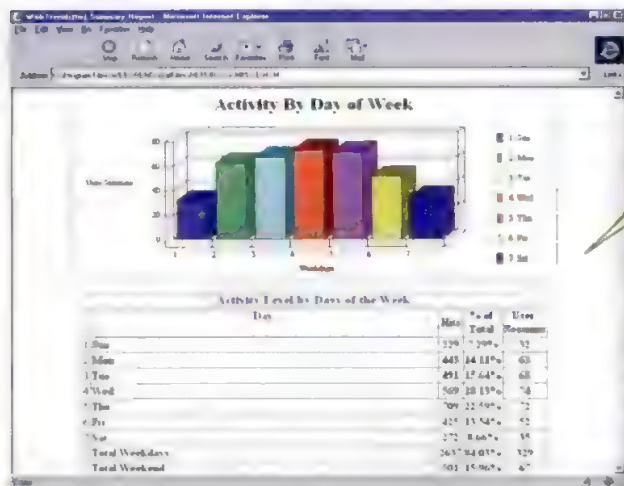
Description	URL Path
Les' personal web server	file:///i:/winnt/system32/logfiles/in960923.log
Sample Log (Local File)	file:///i:/samples/sample.log
Sample Log (Remote via FTP)	ftp://ftp.egsoftware.com/samples/sample.log
Sample Log (Remote via HTTP)	http://www.egsoftware.com/download/samples

File Size	First Date	Last Date
494 K	01/12/96 15:37:55	01/25/96 16:37:37

Next scheduled report: None.

NETWORK EDITION

First Looks



Give me a report

With WebTrends, you can either use the canned reports or you can create your own.

Once it's installed, WebTrends keeps a list of server logs it knows about. Server logs may exist on any combination of local, network, or Inter/intranet connections. WebTrends can fetch remote server logs via HTTP or FTP. In addition, you can add or remove logs from the list with a few mouse clicks.

Once you've told WebTrends where to find your logs, you're off and running. To create a report, you simply select the log file from the list and click on the Report icon. WebTrends reads in the data from the log file, produces the

report, and launches your browser so that you can view the finished report.

Seven canned report styles are provided with WebTrends; the different styles let you focus on different aspects of the server's operation. For example, the provided Technical Summary report focuses on connection and traffic-related information, and the Complete Summary report shows detailed information about every aspect of the server. You can create your own report templates to include or exclude items from your report by selecting the report items from a pull-down menu.

If you prefer, WebTrends can use a Domain Name Service (DNS) to convert logged IP addresses into fully resolved host names. Web-

cial drivers are required, and WebTrends ran without a hitch on our Windows 95 and Windows NT 4.0 test systems. We tested it with several server logs. These logs were produced by

Microsoft Internet Information Server, Netscape Commerce Server, and Quarterdeck's WebStar. The program can also read logs produced by virtually any Web server program.

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NETWORK EDITION

First Looks

Trends uses this information to identify the location of each Web client, and it can even determine the country and city for most clients.

If you're working with a very large server log and are looking for a specific type of data, WebTrends can filter the log data for you. You can use filters to restrict the log data to include or exclude server log records based on the server return code, the client's domain

name or domain type, regions, specific countries, the requested file type, and even individual IP or subnet addresses.

WebTrends also includes a log file viewer that lets you look through a server log line by line. The viewer presents the log entries in an attractive, text editor-style interface, and a find button lets you locate specific records quickly.

With WebTrends, you can even generate log reports

when you're not around. A scheduler feature lets you tell WebTrends which log file to report on and where to place the finished HTML document. You set up a schedule, leave WebTrends running, and it does the rest. Also, WebTrends can have several scheduled events active at once, so you can monitor several logs at once.

A valuable tool for any Webmaster, WebTrends is es-

pecially worthwhile for people in charge of commercial or high-traffic Web sites. A free trial version is available for download (1.4 MB) from the company's Web page. Your download will be logged, charted, and graphed before the day is out.—*Les Freed*

WebTrends 2.0. List price: \$299. e.g. Software Inc., 503-294-7025; fax, 503-294-7130; www.webtrends.com. Circle 968 on reader service card.

E-MAIL MONITORING SOFTWARE

The Checks Are in MailCheck

By Les Freed

If you've ever wondered where e-mail messages go when you click Send, Baranof Software's \$295 MailCheck will be glad to show you. MailCheck is an innovative Microsoft Windows program that monitors e-mail system connections and alerts you if a problem occurs. MailCheck works with virtually any type of e-mail system, including Internet POP and SNMP mail, Lotus Notes

took us only 15 minutes to install and set up the program. After you install the software from three floppy disks, you tell MailCheck which systems you want to monitor and how often to check them.

The main MailCheck display shows a list of your target mail systems, along with a color-coded icon—red, yellow, or green—to show the status of the target system. If you like, you can opt for a graphical dis-

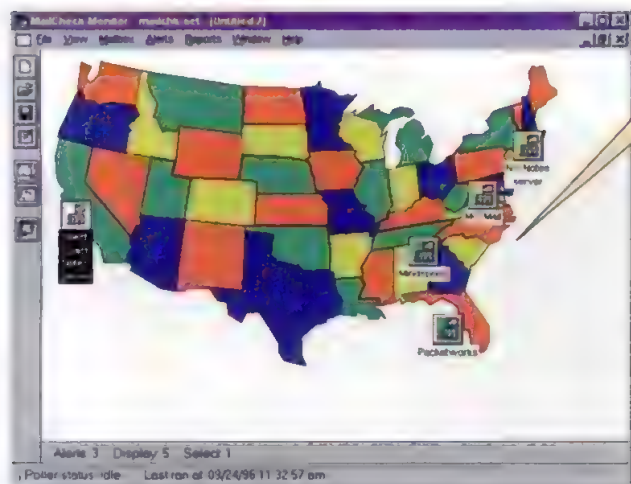
to keep tabs on the end-to-end connectivity of your e-mail network. These probe messages are sent from the machine running MailCheck and are bounced back in one of two ways. For in-house e-mail systems, you use the MailCheck Echo program, which runs on a machine connected to your LAN or WAN. Echo receives messages from the main MailCheck program, and echoes them back. You need a dedicated e-mail account for each Echo responder. Because the probe messages are very small, they have

know anyway. We had mixed results using this method in our testing. MCI Mail, in particular, often takes several hours to respond with the "addressee not found" message. Several Internet POP and SNMP mail servers responded almost immediately, as did our own Lotus Notes server.

MailCheck uses a rules-based alerting system, which allows you to define what action MailCheck should take when it encounters a slow or unresponsive mail system. Baranof offers a customized version of Ex Machina's Notify! Pager notification software (\$395), so that your e-mail empire can keep you when it needs your attention. Baranof also offers some add-on packages that work with MailCheck. An SNMP alerter (\$495) takes alert messages generated by MailCheck and routes them to an SNMP agent on your network. And a Web Enabler (\$495) add-on lets you check the status of your e-mail system from any Web browser.

For the statistically inclined, MailCheck includes a simple but flexible report generator, which produces attractive reports showing response times, availability outages, and a histogram of system response times.

MailCheck. List price: \$295. Baranof Software, Watertown, MA; 617-926-6626; fax, 617-926-6636; www.baranof.com. Circle 958 on reader service card.



Bases are established

MailCheck allows you to create a map of your e-mail empire.

a minimal impact on your mail system's traffic level.

In case you don't want to set up a dedicated account, or if you use public or Internet e-mail services, MailCheck uses a sneaky technique called Bounce Polling. With this method, MailCheck sends its probe messages to a bogus account on the target e-mail system. Most e-mail systems, including Internet POP and SNMP systems, immediately send back a "no such addressee" message when they receive a message for a non-existent account. MailCheck watches for these messages and takes them as an acknowledgment that the target system can in fact receive and send mail, which is all it wants to

and cc:Mail, MCI Mail, Microsoft Mail, Novell Group-Wise, and several others.

We tested MailCheck on a mixed bag of e-mail systems including two POP accounts, two Lotus Notes servers, and the public MCI Mail e-mail network. Even with this melange of mail servers and networks, it

play, using one of several provided maps as a background. You can use any .BMP file as a background, and you can position any icon any place on the map. This allows you to create a NASA tracking station-style map of your e-mail empire.

MailCheck uses short e-mail messages, called probes,

New Matrix-UPS:

Our award-winning reliability is now custom enhanced for your datacenter



"The consensus among resellers participating in the UPS category of this year's

Channel Champions survey seems to be simply this: If you want a UPS that absolutely will not fail, go with American Power Conversion."
— Computer Reseller News

APC has won numerous awards for reliability.



Custom SmartSlot™ Management Adds Uptime, Reliability

Now, APC's award-winning accessories plus, directly into the new SmartSlot bay on the back of your Matrix-UPS. Simply select the SmartSlot accessories you need, and slip them into place! You'll receive alerts when high temperatures caused by failed AC (alternator) hardware, so you can respond quickly to save your endangered hardware. Matrix has remote, orderly system shutdown to eliminate the need for extra support staff. These benefits and more make Matrix-UPS the most reliable datacenter power protection

Award-winning Reliability

APC's modular design detaches the threat of a single-point failure that plagues existing midrange UPS's, and makes installation a breeze. The unique, innovative "modularity" also isolates any problems to their self-diagnosing, hot-swappable "block." And a new Matrix-UPS will even predict problems before they can lead to expensive downtime. The resulting reliability will finally give you the chance

to reduce service and support calls so you can spend your time on more rewarding tasks, such as an evening with your family.

Unlimited runtime suits any application

A Matrix-UPS 5000 with two SmartCells™ can support eight Compaq SystemPro (4000 VA) servers for nearly 25 minutes. Eight SmartCells provide two hours of back-up power. Now you can quickly and easily add hours of runtime with new SmartCell™ XR's. They pack four times the runtime of a typical SmartCell, for custom, extended system uptime to suit the needs of any application and any network.

You'll also find that Matrix-UPS reliability has never been more affordable with list prices starting at just \$1599. So take the expert advice of editors and datacenter managers around the globe and piece together the most reliable network possible choosing custom, modular Matrix-UPS power protection.

Select your FREE Power Management Package:

- A Multiple Server/OS Management Option**
 - 3 copies of any PowerChute plus software*
 - SmartSlot UPS Interface Expander
- B Remote DataCenter Management Option**
 - 3 copies of any PowerChute plus software*
 - SmartSlot Call-UPS II
- C Environmental Management Option 1**
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 - SmartSlot Measure-UPS (Temperature only)
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- D Telecommunications Option**
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 - SmartSlot Relay I/O Module
- E Remote AS/400 Management Option**
 - Control-UPS 400
- F SNMP Management Option**
 - SmartSlot iBaseT SNMP Adapter

*See table AS-400, please. PowerChute plus for DEC, iPS not provided.

Call-UPS II™ Remote UPS Management Device
Remotely manage an APC UPS via modem. The unit provides complete UPS information, paging on power problems and remote safe reboot of servers via user supplied modem.

Remote Relay I/O Module
Integrates full UPS control into dry contact environments such as, FAX's, telecom management and building security systems.

UPS Interface Expander
Provides two additional ports to facilitate safe system shutdown and advanced UPS management of up to three servers from one UPS. The unit is ideal for "server farms" or multiple operating system environments, since all three servers can be running different OS's.

Measure-UPS II™
Provides monitoring of temperature, humidity and other environmental conditions through the interface for PowerChute plus, PowerNet SNMP or Call-UPS II users.

SmartSlot™ iBaseT Adapter
Allows connection of APC Smart-UPS or Matrix-UPS to an SNMP managed network for complete enterprise-wide UPS management.

FREE 30 Day Trial!

- ☐ Yes! Call me with more info about my 30-day FREE Trial. The Matrix-UPS enhanced solution package includes PowerChute plus award winning software and/or SmartSlot Accessory. Choose from the Custom Management Package Options above.
- ☐ No. I'm not interested at this time, but please send a FREE 60-page Power Protection Handbook.

Name

Company

Address

Phone Fax

Email

Is this your first contact with APC? Yes ☐ No ☐

Brand(s) of UPS used?

Number/Kind of Servers?

Management package interested in:

*Management package interested in: APC's award-winning software and/or SmartSlot Accessory. Choose from the Custom Management Package Options above. If you request a refund, request is responsible for return shipping costs. Return must be received in its original packaging and in "like-new" condition.

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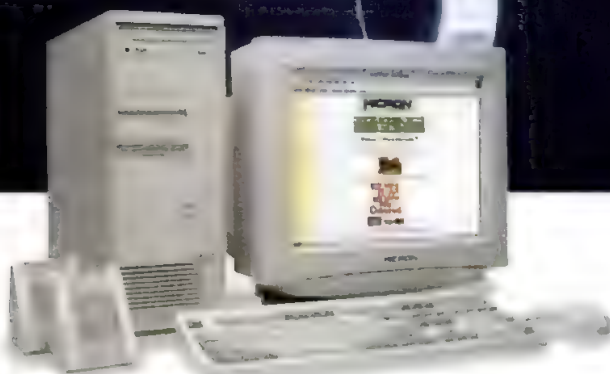
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New & Improved

NEWS OF ANNOUNCED PRODUCTS AND UPGRADES

By Michelle Schoenung

Multifunctional Modem

MODEMS AREN'T JUST FOR SIMPLE DATA TRANSMISSION anymore, as evidenced by MultiTech Systems' voice mail modem.

The **MultiModemZDXV** (\$299 with bundled Trio voice mail software) enables users to send and receive faxes, e-mail, or voice messages.

This is a useful feature for creating and sending customized voice messages to multiple mailboxes or adding verbal instructions to a fax. The user can manage all forms of communication through a single in-box.

The product provides 28.8-Kbps V.34 data and 14.4-Kbps Class 2-compatible fax capability. It also supports industry standard IS-101 AT+V commands for voice control.

MultiTech Systems, Mounds View, MN; 800-328-9717; www.multitech.com. Circle 959 on reader service card.



Add verbal or e-mail instructions to a fax with the MultiModemZDXV.

More Funk

FUNK SOFTWARE HAS INTRODUCED an upgrade to its Proxy remote-control software.

Proxy, Version 2.0 (\$149 for a one-master/one-host license), which can be used by both off-site employees to dial into the network and information managers to manage the network, adds IP and Microsoft Windows 95 support.

In addition, it includes advanced security, automated task features, and more high-resolution color video displays. Funk Software Inc., Cambridge, MA; 617-497-6339; www.funk.com. Circle 960 on reader service card.

Hyper Speed

FOR NETWORKS THAT demand fast, simultaneous CD-ROM access, Procom introduces a line of CD-ROM arrays and servers that provide up to 30X data-transfer rates.

The **Hyper CD** family (\$6,186 to \$76,950) includes 6-, 12-, and 18-drive arrays and 12-, 18-, and 63-drive server models.

The arrays and servers come with 4X CD-ROM drives, but a special CD controller revs performance to 30X. Procom says that users can access

CD-ROMs at an unprecedented rate of 4.5 Mbps.

Each product comes with OS drivers, preloaded

CD-ROM management software, and a SCSI cable. After a Hyper CD array or server is attached to a network and the power is turned on, CD images are automatically transferred to the controller through fast read bursts.

Procom Technology, Irvine, CA; 800-800-8600, ext. 414; www.procom.com. Circle 961 on reader service card.



No wait for data with Procom's Hyper CD line.

HOT PROSPECT

Universal OS Upgradability

One of the biggest headaches for anyone overseeing a large network is installing new software or upgrading operating systems across the organization. Intel Corp. claims its new remote-configuration product will eliminate the need to spend time at each workstation.

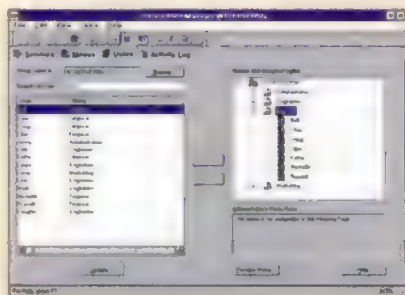
The **LANdesk Configuration Manager** (price not yet available), which will be on sale by the end of the year, is a combined hardware/software product that sits independently on the LAN. It lets network administrators set up uniform desktops for everyone on the network from a central location. To do so, administrators have to install an Intel Service Agent in each desktop PC.

The product allows the network administrator to create and store a select PC configuration (such as a migration upgrade package). The Configuration

Manager stores configurations, including hardware drivers, desktop operating systems, and workgroup-specific applications.

Once the setting of specifications is complete, any authorized person can download the setup from anywhere on the network.

Intel Corp., Santa Clara, CA; 800-538-3373; www.intel.com. Circle 956 on reader service card.



Pacesetter

ADC KENTROX HAS ANNOUNCED several new additions to its Pacesetter line of remote access routers.

Among them are the **Pacesetter HDSL** (\$1,195), and the **Pacesetter SOHO** (\$995), which are aimed at small offices and telecommuters.

The HDSL router, which will not be available until early 1997, supports Ethernet transmission at speeds of up to 768 Kbps.

The SOHO router—now available—has one ISDN BRI port and two POTS ports. It integrates a four-port 10Base-T hub.

Both products support dial-on-demand IP/IPX routing, so that users can be automatically connected to the LAN or Internet.

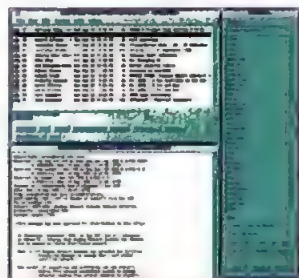
ADC Kentrox, Portland, OR; 800-232-5879; www.kentrox.com. Circle 963 on reader service card.

New & Improved

Solstice Mail

THE MUCH-AWAITED IMAP4-based e-mail package from Sun Microsystems will soon be shipping.

Solstice Internet Mail 2.0 (\$795 for the server and 50 client software licenses) will run on Solaris and support



Solstice Internet Mail benefits from new IMAP4 features.

IMAP4, MIME, POP3, and SMTP. The product supports most POP3 and IMAP4 e-mail clients as well as Microsoft Exchange clients.

The server-based IMAP4 open Internet protocol gives IMAP4-compatible e-mail clients the ability to download messages and attachments. Unlike POP3, IMAP4 keeps all messages on the server after downloads.

Sun Microsystems Inc., Mountain View, CA; 800-786-7638; www.sun.com. **Circle 962** on reader service card.

Internet at The Ready

LOOKING MORE LIKE A kitchen toaster than an office network device, Whistle Communications' **InterJet 100** (\$1,995) provides you with Internet connectivity in a small package.

Whistle Communications in comarketing the InterJet 100 with ISPs to enable small businesses to use e-mail and browse the Web.

The small InterJet 100 IP router/Web server/e-mail server is connected to an Ethernet LAN and communi-

cates with the ISP via the InterJet Commander software, which is installed on the ISP's system.

The software tracks billing for the ISP and is able to detect problems at the customer site.

The InterJet comes with a 1GB hard disk and supports analog, ISDN, and T-1

Convenient connectivity for the small-business user. Just plug it into your Ethernet LAN.

data communications lines. **Whistle Communications**, Foster City, CA; 415-577-7000; www.whistle.com. **Circle 965** on reader service card.

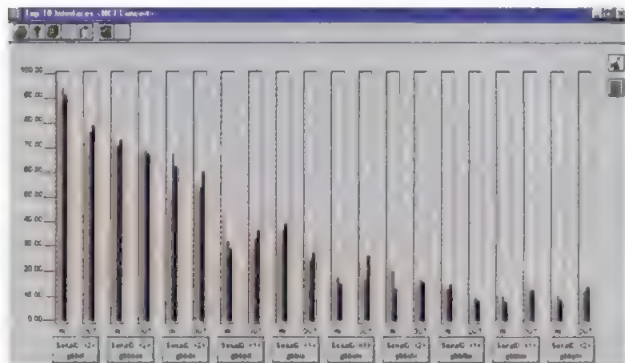


WAN Watch

STONYBROOK SOFTWARE has introduced **WANServices Manager** (\$4,995) in a 32-bit version.

Using discovery algorithms to glean connectivity information, the WANServices Manager can monitor and manage Frame Relay, ISDN, and X.25 network services.

The product provides a graphical view of the network, and clicking on a particular component furnishes more specific information. This enables the network administrator to drill down to a virtual circuit to troubleshoot prob-



Keep tabs on who is on the telephone and for how long.

lems or detect congestion.

Network administrators can set alarms for user-defined conditions, so that, for example, ISDN calls do not last

longer than the allotted time. **StonyBrook Software**, Bohemia, NY; 516-567-6060; www.sbbook.com. **Circle 964** on reader service card.

BRIEFS

Hardware

Ornet Data Communications Technologies' new MetaSwitching modules add 100-Mbps capability to its LANbooster family of switches. The **LANbooster 3600 Workgroup Switch** (\$3,295 for 12 10Base-T and 1 100Base-TX ports) and **LANbooster 5600 Enterprise Switch** (\$8,995 with 24 10Base-T, 4 100Base-TX ports, and 1 100Base-FX port) allow users to choose from different port configurations (800-808-6638) LeeMah Data-Com has added a new autoloader and an

enhanced GUI to its **BandWagon Remote Access Servers** (\$5,800). The autoloader boots the unit, auto-configures the system for an Ethernet connection, and locates the local or remote connection. The client and management software sport more icons and easy-to-read screens (800-331-2734).

Software

Sphere Communications will soon introduce a software PBX application that will carry voice and data traffic over a 25.6-

Mbps ATM LAN. **Sphericall** (price not yet available) includes voice mail, built-in CTI, and a suite of TAPI applications. It runs as a client/server application on a Microsoft Windows NT server and Windows NT or Windows 95 clients (888-774-3732) A new version of Omtool's Fax Sr. for Windows NT is now available. **Fax Sr. 1.2** (\$2,495) adds a print-to-mail feature, support for multiple simultaneous mail systems, and increased integration with Microsoft Exchange Server (800-886-7845).

Upgrading an overpacked laptop sure can be slow.

If you're running out of portable hard drive space, why waste time with a manual transfer? Speed up with VisionTek's ExtremeDrive™ — the all-in-one solution for boosting storage capacity.

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New & Improved

Proxim

THREE NEW 2.4-GHZ WIRELESS LAN products have been added to Proxim's RangeLAN2 family.

The **RangeLAN2 7400 PC Card**



RangeLAN2 7400 PC Card features 1.6-Mbps throughput and an interchangeable antenna.

(\$695) and the **RangeLAN2 AP-II 7510** and **7520 Access Points** (starting at \$1,895) are backward-compatible with existing RangeLAN2 products.

The 7400 is a one-piece, 1.6-Mbps PC Card adapter with an interchangeable antenna.

The 7510 is a base-model access point, while the 7520 offers full SNMP support. Both are compact (weighing 1.5 pounds) and provide network management software. **Proxim Inc.**, Mountain View, CA; 800-229-1630; www.proxim.com. **Circle 966** on reader service card.

Switchbox

MATROX NETWORKS jumps into the switching waters with its **Switchbox** (preassembled configurations start at \$1,799).

The modular Switchbox has three slots for integrating Ethernet and Fast Ethernet switching modules into a chassis.

The Switchbox can be configured using either the Piranha or Shark modules. The Piranha module has eight switched 10Base-T ports. The Shark module

comes with either two switched 100-Mbps ports and two 100Base-TX ports or one 100Base-TX port and one 100Base-TX/100Base-FX port.

Matrox Networks, Montreal, Quebec, Canada; 800-837-3611; www.matrox.com. **Circle 967** on reader service card.



Sink or switch: Keep your network afloat with a variety of Matrox switching modules.

MULTIPLE ACCESS By Steve Buehler

Watching You, Watching Me



I just got a press release for an upcoming product—EtherPeek for Windows. Available from the AG Group (www.aggroup.com), this is a Microsoft Windows port of the famous Macintosh network sniffer that lets you watch all the traffic on your LAN. Though I've always

respected the original EtherPeek (and the multitude of snoop programs available on the Net), I felt my paranoia resurfacing.

Sniffer products are useful tools. We've got a Data General unit in our Foster City test lab that we use all the time to figure out where the bottlenecks in a system are. In the right hands, these are valuable tools. In the wrong hands, sniffers give people access to data they have no business seeing. At one Unix connectivity company I worked for, we'd go through a period of hacking everyone's passwords. Then we'd get bored, drop it for six months, and start all over. We weren't being malicious, but we did irritate some people. Since we were all developers, however, we figured it was part of the game.

Now the game is getting bigger. When I saw a beta copy of EtherPeek, I was initially impressed by its ease of use. The other side of that coin, though, is that almost anyone on the inside of your firewall can be sitting on the wire watching the data passing by. Although network administrators usually

focus first on the threats from intruders, the risk of compromising data inside your firewall is now high and increasing.

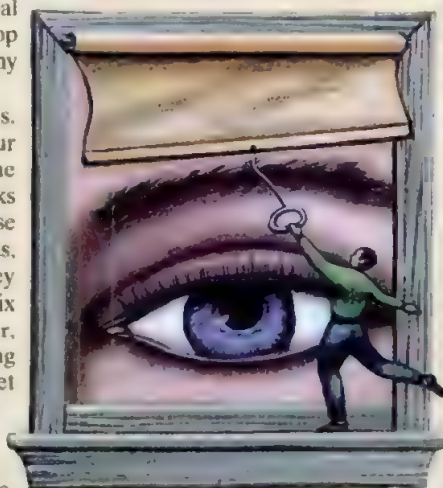
At NetWorld/InterOp, I saw a few security products that eased my fears—but only somewhat. The first was NetCrypto, from McAfee Associates (www.mcafee.com). This product (once known as CipherLink, from FSA) encrypts packets between nodes on a network, making them unreadable to the casual observer. NetCrypto provides transparent encryption between nodes that support it. A user logging on to a server sees no difference between a secure connection and a vulnerable one, but underneath the hood, NetCrypto is establishing a

trusted connection, scrambling the data, and unscrambling it when it gets to the desired receiver. With support for Blowfish, DES, RSA, and several other standards, this is a heavy-duty tool. It's shipping now and starts at \$100 per user, dropping to \$80 per user when you purchase it in large quantities.

Another product in this arena is Snare, from Capital Resources Computer (www.capres.com). Snare also uses RSA encryption to scramble packets between nodes, and its security is strong enough to have been incorporated into DCE/Snare from Intellisoft for those environments extending DCE to the desktop. Starting at only \$50 per seat and dropping with volume purchases, Snare's worth a look whenever you get the feeling that some-

one's looking over your shoulder.

Prediction: It won't be long before most management suites from McAfee, Symantec, and others will include security tools like these. The only question is how much of your company's data will be compromised before you pull the shades on whoever's watching.



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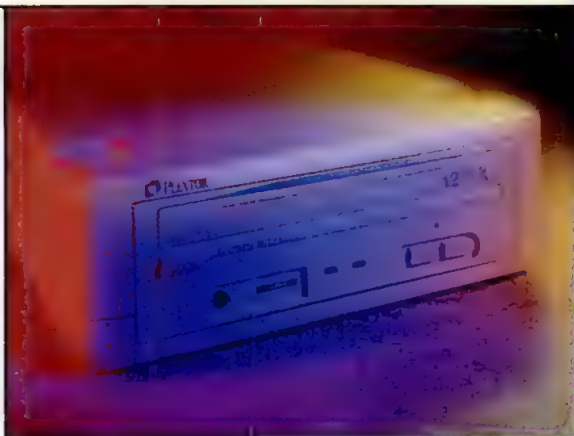
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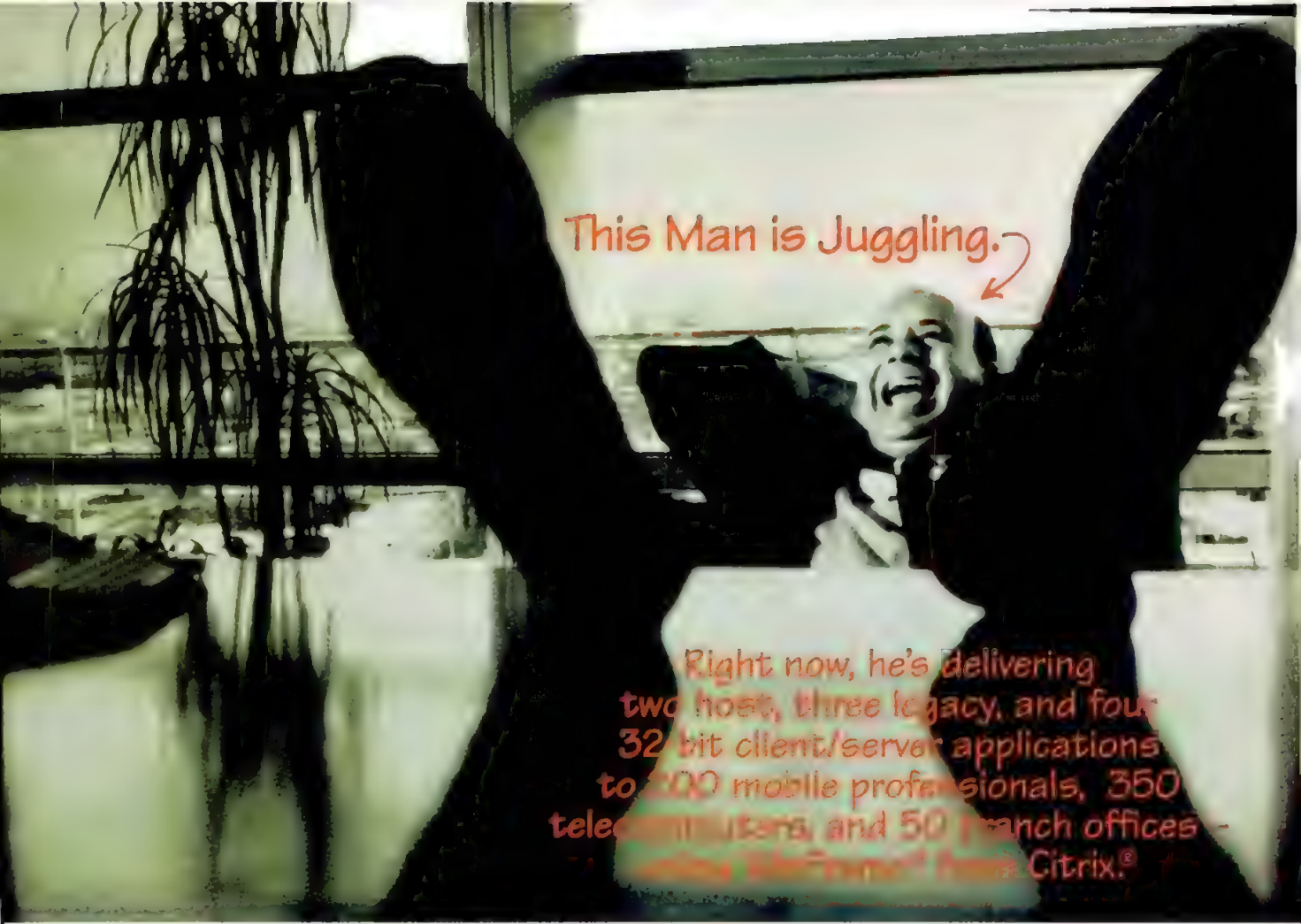
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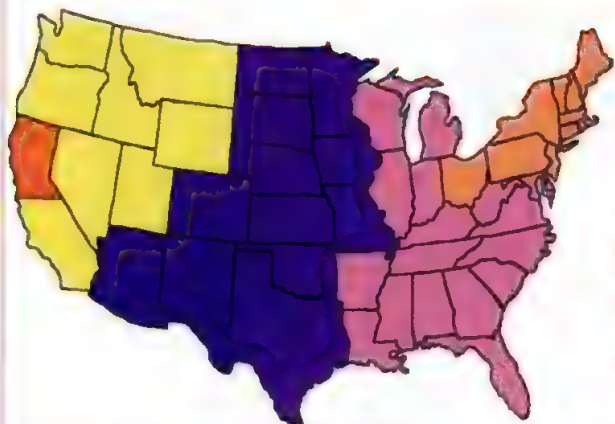
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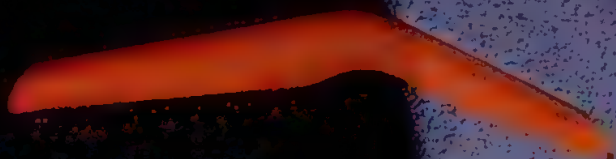
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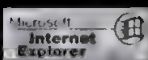
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SUITE

A NEW LOOK Corel Office Professional 7 introduces a revamped version of what was once known as WordPerfect Presentations.

MORE ART The Corel suites also come with hundreds of new clip-art files.

JAVA Among Corel's major enhancements is its Java-based Barista WYSIWYG Web-output tool.

Basic business applications still account for the lion's share of desktop computing. Are your suites up to snuff? *By Michael J. Miller*

It's that time again. Time to decide whether the suite of productivity applications on which you probably run your business is good enough, or whether it's time to upgrade or even switch. The good news is that word processors, spreadsheets, and presentation-graphics software—and the suites that pull them together—are a mature bunch of products. The only bad news you may face: Maybe you're the one who has to replace the older products with these upgrades across an office full of desktops.

The application-suite market remains a three-horse race between the dominant

Microsoft and Corel and Lotus. Here we preview the many new features and trends in the next round of suites. Corel is already shipping its new offerings, while Lotus and Microsoft are very close to doing so. In an upcoming issue, we'll publish our standard labs-based comparison of the shipping suites.

Microsoft is the incumbent in most organizations, either with its 16-bit version, Office 4.x (which will remain on the market), or with the 32-bit Office 95, introduced last year. Microsoft is supplanting the latter with Microsoft Office Professional 97. This latest suite also comes with Outlook (Microsoft's Desktop In-

formation Manager, which can also act as an e-mail front end) as well as with improved integration among all its major applications. Not to be outdone, Lotus is nearing completion of its Lotus SmartSuite 97, which includes updated versions of its programs, including the first 32-bit version of its spreadsheet Lotus 1-2-3 for Windows.

And Corel recently shipped two new entrants. (Earlier this year it acquired the desktop-application business from Novell, which had previously acquired WordPerfect Corp. and Borland's Quattro Pro.) WordPerfect Suite 7 gives you the basics—the WordPerfect

PEEKs

32-BIT AT LAST Lotus SmartSuite 97 will introduce a 32-bit version of Lotus's spreadsheet, Lotus 1-2-3.

INTELLIGENT HELP Office Professional 97 also adds the new, animated Office Assistant.

ON TO THE WEB Microsoft Office Professional 97 will add Internet-based functionality throughout all of its major applications, including an Online Page Layout setting.

GRAND TOTAL A brand-new feature will total any row or column when you type the word *total*.

ART FOR US ALL The new shared OfficeArt graphics application works with all the major suite applications.

word processor, the Quattro Pro spreadsheet, and the Presentations graphics software—along with a few bonuses, all for a \$129 upgrade street price. Corel Office Professional 7 adds the licensed version of Borland's Paradox 7 database and the illustration module from Corel's Draw program.

Although each suite has unique features, in many ways the three are moving

in similar directions. For starters, all are designed to work on Windows 95, and both the Microsoft and the Lotus suites work on Windows NT Workstation as well. In addition, each vendor has made a considerable effort to tie together the user interfaces and programming languages that affect at least the major components.

For example, Microsoft is now offering Visual Basic for Applications and a

Our Contributors: MICHAEL J. MILLER is the editor-in-chief, and BEN Z. GOTTESMAN is a technical director at *PC Magazine*. EDWARD MENDELSON, STEPHEN W. PLAIN, and CRAIG STINSON are contributing editors, and WAYNE KAWAMOTO is a frequent contributor to *PC Magazine*. LANCE N. ULANOFF was the senior associate editor in charge of this story, and DAN SMITH was the associate project leader.

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At a Glance: Suites Past, Present, and Future

APPLICATION SUITE

Novell PerfectOffice 3.0, Professional WordPerfect 6.1 for Windows, Quattro Pro for Windows 6, WordPerfect Presentations 3.0, Paradox 5.0; AppWare, Groupwise 4.1 client license, Envoy, InfoCentral 1.1.

Corel WordPerfect Suite 7 Corel WordPerfect 7, Corel Quattro Pro 7, Corel Presentations 7; CorelFlow 3, Corel ScreenSaver, Envoy 7, Quick View Plus, Starfish Dashboard 95, Starfish Sidekick 95; 150 fonts, 10,000 clip-art images. **List price:** \$395; upgrade \$129.

Corel Professional Office 7 Adds Paradox 7; Corel A to Z, CorelDraw 6 illustration module, InfoCentral, 200 photos; 1,000 fonts. **List price:** \$695; upgrade, \$249.

Lotus SmartSuite 96 Word Pro 96, Lotus 1-2-3 Release 5, Freelance Graphics 96, Approach 96; Organizer 2.1, ScreenCam 2.1, SmartCenter 96. **List price:** \$399; upgrade, \$199.

Lotus SmartSuite 97 Word Pro 97, Lotus 1-2-3 97, Freelance Graphics 97, Approach 97; Organizer 97, ScreenCam 97, SmartCenter 97. **List price:** \$399; upgrade, \$149.

Microsoft Office for Windows 95 Microsoft Word for Windows 95, Microsoft Excel for Windows 95, Microsoft PowerPoint for Windows 95; Microsoft Schedule+ for Windows 95. **List price:** \$499; upgrade, \$209.

Microsoft Office Professional 95 Adds Microsoft Access for Windows 95. **List price:** \$599; upgrade, \$309.

Microsoft Office 97 Microsoft Word for Windows 97, Microsoft Excel for Windows 97, Microsoft PowerPoint for Windows 97; Microsoft Outlook for Windows 97. **List price:** To be announced.

Microsoft Office Professional 97 Adds Microsoft Access for Windows 97. **List price:** To be announced.

FEATURE ENHANCEMENTS

The primary applications (WordPerfect, Quattro Pro, Presentations, and Paradox) have surface-level interface consistency. All of the applications are OLE 2.0 containers and servers. The desktop Application Director now includes QuickTasks macros. The suite also adds the QuickFinder file manager. All of the major applications except Paradox can now use the PerfectScript cross-application macro language. (Corel Corp. purchased Novell's WordPerfect Applications Group and now ships this suite as Corel Office Professional for Windows 3.1. **List price:** \$499; upgrade, \$249.)

This version is entirely 32-bit and is built specifically for Windows 95. All products now have a Windows 95 look and feel. The Barista technology (Professional suite only) in WordPerfect, Quattro Pro, and Presentations creates Java representations of documents, spreadsheets, and slide shows. These applications can also export to Envoy or HTML. You can ask for help in natural language using Ask the Perfect Expert.

Word Pro, Freelance, and Approach (all 32-bit) use the Lotus Common User Interface and use the same menu structure. Lotus 1-2-3 and Organizer remain 16-bit. The programs provide context-sensitive pop-up help. The suite provides Smarticons—toolbars that change with the format. The key focus of the suite is team computing. The 32-bit applications provide a standardized status bar, a context-sensitive InfoBox for one-click access to settings, a common design for dialog boxes, and the LotusScript programming language. Includes shared tools and code, as well as support. Has an improved SmartCenter taskbar with four drawers (the Calendar drawer, the Address drawer, the Help drawer, and a customizable drawer).

All of the applications are 32-bit and have common Internet dialog boxes and Internet Smarticons. LotusScript is common across all of the applications and now has a dialog editor. Lotus 1-2-3 and Organizer now use shared tools. The enhanced SmartCenter includes a mini Web browser, a dictionary, and a thesaurus.

Includes the Answer Wizard natural-language help system. Introduces Office Binder, which lets you combine documents of various types (Word 95, Excel 95, and PowerPoint 95) into one file, called a Binder file. Introduces DocObjects, documents that act like software objects, so that you can put them inside an object container (such as a Binder file). You can now assign document properties to aid in tracking documents. All of the applications are 32-bit. Schedule+ has new capabilities, such as contact management and customizable views.

Office Assistant improves the help facility. An improved Office Binder allows Binder-wide headers and footers. Tear-off menus and toolbars are combined into a customizable Command Bar. Introduces OfficeArt graphics tools. Provides full-text searching of Office and HTML documents. Users can create links to Office documents or to Internet sites. Users can save documents in HTML format. Outlook replaces Schedule+ and provides a mail client and a calendar, as well as contact, task, and document management. Web Toolbar brings browser functions to all the applications except Outlook. All the apps support Visual Basic for Applications or VBScript.

set of common command bars. Lotus has extended LotusScript and is providing its InfoBox tool for changing properties across nearly its whole suite. And Corel's PerfectScript and QuickTasks, while they do not affect as many components, enable users to move between multiple applications more easily.

Each vendor has also improved the individual applications in a number of ways.

All of the word processors have on-the-fly spell-checking, and 1-2-3 is introducing a welcome feature that totals your rows and columns when you simply type *total*.

Still, perhaps the most significant changes reflect these products' evolution into workgroup-oriented tools: All three suites offer tools for both editing and saving all types of major work in HTML for the Internet. Corel has also presented a

new technology, *Barista*, that lets you save your page as a Java applet with much more control over formatting and fonts.

In addition, these suites now enable varying degrees of collaboration. Microsoft and Lotus do a nice job of routing messages through e-mail. Microsoft has also built multiuser access into Excel, while Lotus has extended its TeamMail and TeamReview collaborative features

WORD PROCESSOR

WordPerfect 6.1 for Windows

Includes QuickCorrect and the Make It Fit wizard, which alters page margins, font sizes, and other attributes to fit documents into a specified number of pages. Search-and-replace can find any form of a word.

Corel WordPerfect 7

Provides improved Internet integration via Internet Publisher, hypertext linking to URLs, easier access to formatting controls with QuickSpots, and on-the-fly spell-checking.

Word Pro 96

Formerly Ami Pro. Allows you to open HTML documents directly, and save and retrieve Internet files using FTP. Enables creation of HTML documents, with support for URL links. TeamMail lets you send files to a number of individuals. TeamConsolidate tracks revisions.

Word Pro 97

Enhanced HTML editor simplifies creation of links and forms and inclusion of OCX controls. Also adds text flow across frames and new desktop publishing functions such as drop caps and booklet printing.

Microsoft Word for Windows 95

Provides background spell-checking, automatic formatting and e-mail capabilities, including Webmail. Also adds a new address book.

Microsoft Word 97

Letter Wizard automatically creates common elements of letters. An improved grammar checker proofreads as you type. Document Map displays a hyperlinked outline of a document. Has improved version tracking.

SPREADSHEET PROGRAM

Quattro Pro 6 for Windows

The interface looks more like that of WordPerfect for Windows. A slide-show facility includes master slides for a consistent look. Allows in-cell editing. Provides Formula Composer for writing and decoding formulas.

Corel Quattro Pro 7

Provides improved file compatibility with third-party spreadsheets and HTML. Enables linking files to Web documents for automatic updating. Has built-in mapping, 100 additional @ functions, and significant improvements to the Formula Composer. Provides PerfectScript macros.

Lotus 1-2-3 Release 5

Adds Notes integration, SmartMaster, and enhanced database capabilities through integration with Approach. Also adds Lotus Maps. The Excel 5.0 file filter is built-in for importing Excel files.

Lotus 1-2-3 97

This new 32-bit version includes LotusScript. Internet support lets you publish pages in HTML, access Internet files, and retrieve data from HTML tables. The program provides an editable print preview. Includes AutoTotal, which totals a column or row when you type the word *total*.

Microsoft Excel for Windows 95

Auto-Outline lets you quickly view summary info. AutoComplete completes partially entered data entries based on previous entries. AutoCalculate quickly averages, counts, or adds data.

Microsoft Excel 97

Users can write formulas using column and row headings. Conditional formatting lets you change cell format according to rules you create. Has improved charting. Multiple users can work on one document simultaneously.

PRESENTATION GRAPHICS

Presentations 3.0

The interface is consistent with that of the rest of the suite. Show Expert walks you through creating presentations. Includes wide selection of slide masters.

Corel Presentations 7

Now includes animation, bullet effects, and more transitions. Users can create links to other presentations and files or to the Internet.

Freelance Graphics 96

Can publish presentations in HTML; can save documents to the Internet via FTP. TeamShow lets you give presentations across a LAN. Includes Content SmartMasters to guide the creation of presentations of various types, such as business plans.

Freelance Graphics 97

TeamShow supports multipoint presentations, as well as both dial-up phone lines and the Internet. Enhanced HTML publishing supports frames.

Microsoft PowerPoint for Win 95

Meeting Minder lets the presenter collect audience feedback. AutoClipArt Wizard suggests clip art for presentations. The program can compress presentations onto multiple floppy disks. A user can give presentations over a network.

Microsoft PowerPoint 97

Can automatically create a summary slide. Slide Finder lets you quickly preview slides from other presentations and insert specific ones into your presentation. Action Buttons let the viewer navigate through the presentation.

DATABASE SOFTWARE

Paradox 5.0

New Experts make the program easier. An improved UI integrates Paradox better into the suite. Enables live, editable queries of individual tables. Provides improved SQL connectivity and introduces ODBC support.

Paradox 7

Includes improved Experts and several new ones, including a Startup Expert and a Database Expert. Several database templates have been added. Improvements for developers include better SQL support, Object Explorer, support for 32-bit OCXs, and an enhanced debugger.

Approach 96

Includes Notes PowerKey for fast access to Notes data and TeamMail for routing e-mail to individual users. Adds SmartMasters, LotusScript, and new chart, cross-tab, and worksheet views.

Approach 97

Provides tools for creating Web pages, Internet SmartIcon palette, SQL error-message support, and DB2 Query Management Facility. Adds the ability to record LotusScript.

Microsoft Access for Windows 95

Table Analyzer Wizard helps convert flat-file databases into relational databases. Replication keeps database copies synchronized. IntelliJoin lets users select fields they want to query or to have in a form. A performance analyzer suggests ways to optimize database performance.

Microsoft Access 97

Partial Table Replication lets you choose to replicate a subset of a table. Publish to the Web Wizard lets you publish live, interactive database pages. Lets you replicate over the Internet. Filter by Input lets you enter search criteria into a text box.

to all of its major applications.

Microsoft's approximately 85 percent revenue share of the suite market has had at least one side effect: Lotus and Corel seem willing to cut prices and offer more, just to grab your attention. In addition to the incredibly low upgrade price for Corel's WordPerfect Suite, the huge number of applications in its Office Professional will make you do a double take. And with the

SmartSuite upgrade's very competitive price, Lotus is getting into the act, too.

Both companies seem to be reconciled to the role of "spoiler," forcing Microsoft to drop prices or sacrifice market share. But Microsoft is rarely without a game plan, and its counteroffensive seems to be to offer different versions of Office for various sets of users. All this certainly makes for interesting choices on the part

of each vendor's loyal customers.

The real competitor may well be the software you're already using. For most users, these programs' previous versions are quite sufficient, and they still run on new hardware and operating systems. But there's no denying that the new suites, with their focus on Internet connections, collaborative computing, and tighter integration, are compelling indeed.

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APPLICATION INTEGRATION

By Craig Stinson

Integrating a set of major standalone applications into a package worthy of the name *suite* means achieving consistency above all else: a common user interface and consistent approaches to universal tasks, such as file management, editing, formatting, printing, mailing, and seeking help. If a suite shares code among its applications, so much the better, because shared code reduces memory and storage overhead.

The good news is that this year's crop of suites come significantly closer to the ideal than last year's. The not-so-good news is that they may still have some distance to go.

Lotus SmartSuite 97 and Microsoft Office Professional 97 introduce more consistent user interfaces than Corel Office Professional 7. Both SmartSuite and Office Professional 97 feature major applications with nearly identical menu bars and toolbars, common sets of keyboard shortcuts, and common procedures for toolbar customization.

In Microsoft Office Professional 97, your applications' menu bars and toolbars make up a single, integrated UI component called a *command bar*. You can drag menu commands onto icon palettes and icons onto menu bars to form any mixture of text and tool. If a submenu command is nested too deep for your taste, you can drag it up to the top level of the bar. You can drag the bar anywhere, including

out of the application window and onto your desktop. Command bars are a shared-code component of Office Professional 97.

Lotus SmartSuite 97 applications feature the familiar Lotus SmartIcons as well as a live status bar at the bottom of the application window. This bar is a single UI element that displays your status (such as the current style in Word Pro) and lets you change it with a couple of mouse clicks. In addition, this year's SmartSuite applications make more consis-

the spreadsheet a significant UI makeover, so that it now shares a top-level menu layout and some dialog boxes with its suitemates. But Quattro Pro's different roots, as a Borland product (WordPerfect and Presentations are both originally from WordPerfect Corp.), show up in awkward ways. For example, toolbars in WordPerfect and Presentations can display icons, text, or both. Quattro Pro does not offer this flexibility, and its mechanism for customizing toolbars is sharply different.

The Corel suite also includes the database program Paradox 7 and a number of "bonus" applications. Paradox bears little resemblance to WordPerfect, Presentations, or Quattro Pro. The bonus programs, which include CorelDraw 6, CorelFlow 3, Netscape Navigator, Corel Time Line, Sidekick 95, Dashboard 95, Quick View Plus, and IBM VoiceType Control, are similarly unintegrated with the core suite products.

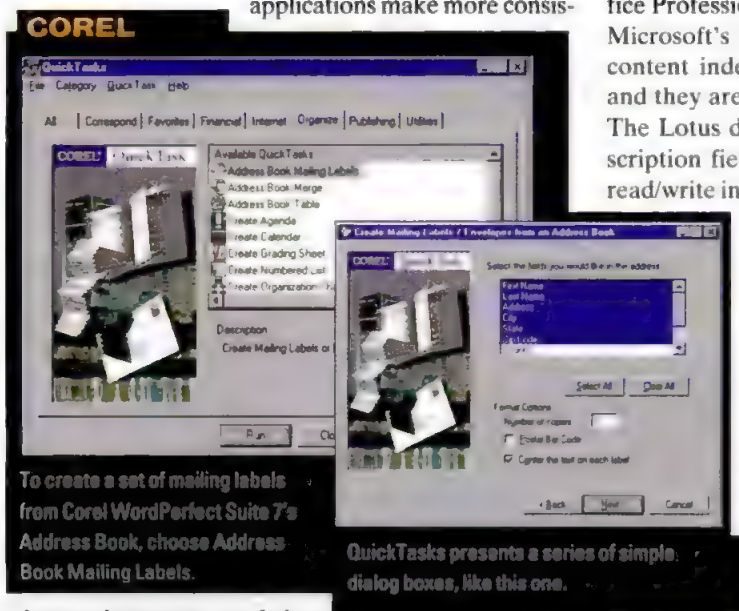
COMMON APPROACHES

Users of all three suites can enjoy file management services that operate the same way in all of the applications. In Office Professional 97, the file dialogs offer Microsoft's counterpart to Corel's full-content indexing facility, QuickFinder, and they are consistent across the suite. The Lotus dialogs include a handy Description field (read-only in File Open, read/write in Save As) as well as access to Lotus Notes and FTP sites.

Microsoft Outlook, Office Professional 97's new information-manager component, has a feature that can record when you open, save, or print any Office Professional 97 document. It can also serve as an alternative to the Windows Explorer for launching documents. A double-click on a journal entry reopens a document in its parent application. In

addition, Office Professional 97 includes Office Binder, an application that lets you gather related Office documents into a single complex document.

Corel's Address Book, Lotus Organizer, and Microsoft Outlook can supply data for mailing labels and envelopes to their word processing mates. But Address Book



tent use of the Lotus InfoBox, a modeless, tabbed dialog box that keeps property settings visible while you work.

Corel's Office Professional 7 achieves a less perfect degree of consistency than its competitors, largely because Quattro Pro remains somewhat out of step with WordPerfect and Presentations. Corel has given

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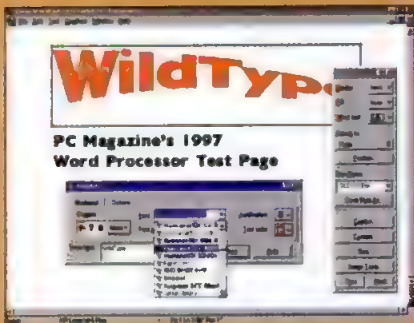


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Word Processors: Retooling for 1997

By Edward Mendelson

The latest generation of suites brings a new level of automation, power, and convenience to word processors, while preserving a high degree of compatibility with earlier versions by supporting older formats. All three of the new word processor versions that we review also focus on Internet inte-



Corel WordPerfect's pop-up conveniences include the toolbar on the right that appears when you click on a QuickSpot icon next to a paragraph, table cell, or graphic; the QuickSpot itself disappears when the toolbar pops up. WordPerfect's font lists use the font itself to display the font name, as in the TextArt dialog box shown here.

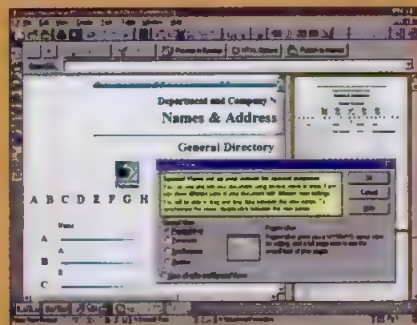
gration to a major extent; see the section called "Internet Tools" for a full discussion.

Corel's first 32-bit version of WordPerfect arrived in mid-1996, first as part of Corel WordPerfect Suite 7, then (with minor bug-fixes) in Corel Office Professional 7. These releases mark the end of WordPerfect's availability as a standalone product: Users must purchase the suite to get the new version. WordPerfect 7's menu structure, toolbars, and file format are almost the same as in version 6.1, but Corel has enhanced usability and added features without further cluttering up a somewhat overloaded interface.

The new version's most visible enhancement is a tiny button called QuickSpot, which appears at the left of the paragraph, graphic, table, or any other page element beneath the cursor. When you click on QuickSpot, a toolbox pops up for easy access to the

page element's formatting controls. Traditional right-click pop-up menus are also available, but they are less convenient. Optional dotted grid lines let you change margins and table borders simply by dragging the lines. A new icon appears in the margin whenever you change a tab setting.

The program now uses a single address book for automated templates and for merges and envelope addressing. An improved interface makes automated templates even easier. WordPerfect's tables have all the features that most users want in a spreadsheet, and they now have formatting features such as rotated cells and diagonal lines in cells. The equation editor remains clunky and code-based, but a graphics-based editor will take its place



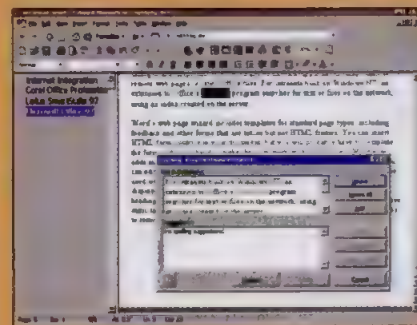
Lotus Word Pro's unique Special Views option offers multiple windows on the same document so you can edit in one window while navigating through thumbnail images in another. You can also create, but not save, custom views.

in the future. WordPerfect is also the last of the major word processors to add on-the-fly spell-checking.

Lotus completely revamped its old Ami Pro word processor when it introduced Word Pro 96, and the new version, Word Pro 97, is notable more for its much-needed improved speed and reliability than for new features. It retains Lotus's unique InfoBox formatting controls and tabbed document divisions, which let you manage compound documents more conveniently than with Microsoft's Binder. Word Pro 97's major enhancement is

the ability to make text flow from a frame on one page to a frame on another page, as in desktop publishing programs. Other new DTP-like features, such as "watermarks," dropped capitals, and booklet printing, bring Word Pro in line with features already in WordPerfect. And Word Pro's collaboration abilities remain unmatched.

Microsoft has given Word a major overhaul for Word 97. A new Letter Wizard offers unequalled ease in creating a variety of letter formats. On the editing screen, a new document layout window lists the current document's headings and lets you jump to a section by clicking on its heading. New collaboration features include version tracking and pop-ups that identify the author and date of any change. The spelling-checker dialog box displays the context of a misspelled word, and the program enhances on-the-fly spell-checking with a feature that suggests



Microsoft Word automatically builds the document map shown at the left, and lets you use it to jump to any section of a file. The new spell-checking dialog displays the context of any doubtful word, not only the word itself.

the remaining text of partially entered words or phrases.

New formatting features include text boxes that flow into boxes on other pages. Drawing and border facilities now match WordPerfect's, with text that wraps around irregular graphics. And advanced features such as numbering and cross-reference now rival WordPerfect's.

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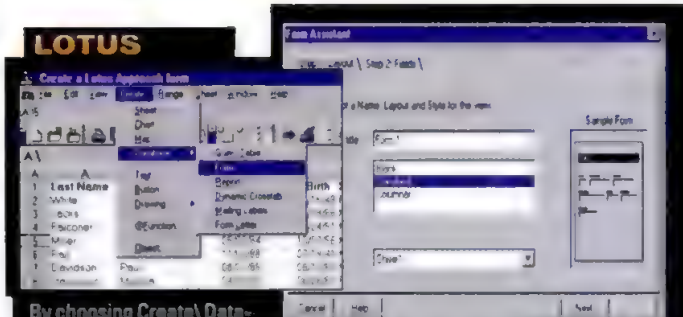
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is not integrated with the Corel suite's other information managers, InfoCentral and Sidekick.

BAILING US OUT

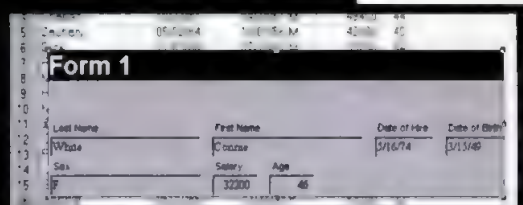
Users looking for help will find a high degree of consistency in all three suites. Microsoft's suite includes the new Office Assistant, a shared-code component. It uses animated characters to answer your natural-language queries and provide tips based on your actions in various Office Professional 97 applications. Office Assistant provides lots of customization options (including one to make the thing shut up and go away), and settings you apply in one program remain in all the others. The help facilities in Corel's suite and in Lotus's Word Pro also let you express yourself in plain English, and all three of the suites consistently provide easy connection from their Help menus to their Web sites.

The Corel and Microsoft suites both offer automatic correction of common typing and spelling errors in their word processors, spreadsheets, and presentation packages. Each suite's programs share a list of such items to correct, so that you



By choosing Create\ Database\ Form in Lotus SmartSuite 97's spreadsheet application, Lotus 1-2-3, you can have Lotus Approach create an attractive data entry form.

The Form Assistant asks you to choose a layout and style.



Your form arrives as an object on the Lotus 1-2-3 worksheet.

shared code. Corel's lag in this department is attributable, again, to Quattro Pro's different origins.

Microsoft is making some significant changes in Microsoft Office Professional 97's drawing facilities. Word, Excel, and PowerPoint all provide identical and particularly rich drawing tools (through a shared component called *OfficeArt*), complete with a new AutoShapes menu, which offers flowchart symbols, smart connectors, callout bubbles, and more. In Lotus SmartSuite 97, Lotus 1-2-3 and Freelance Graphics (both of which allow freehand drawing anywhere) use different drawing interfaces and engines. Word Pro con-

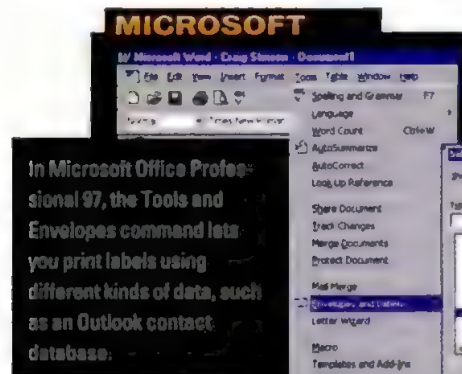
mand takes unwieldy flat Excel lists and turns them into relational tables.

All three suites now offer common scripting languages while maintaining support for their older, application-specific macro languages. You can use Corel's PerfectScript, LotusScript, and Microsoft's Visual Basic for Applications to create custom applications within and across the programs in each suite.

PerfectScript, LotusScript, and Visual Basic for Applications are full-blooded development languages and come equipped with dialog editors, object browsers, and debuggers. (For more details, see the section in this story entitled "Programming Tools.")

Within each suite application, nontechnical users can also record macros to automate routine chores. Only Corel's suite, however, lets you record macros that operate in multiple applications.

In a separate utility, Corel provides the user with a handy collection of



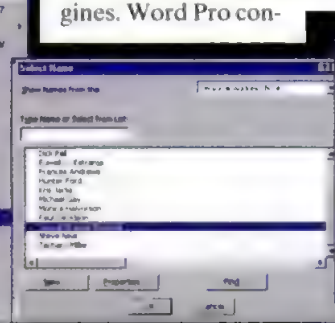
In Microsoft Office Professional 97, the Tools and Envelopes command lets you print labels using different kinds of data, such as an Outlook contact database.

don't have to add your most common mistakes to more than one list. Lotus includes a comparable feature but only in Word Pro.

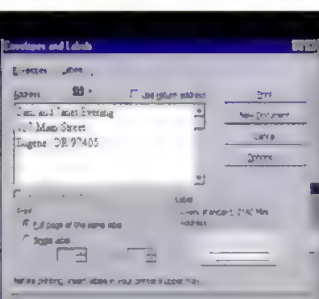
On the charting front, Lotus SmartSuite and Microsoft Office Professional 97 are more strongly integrated than Corel's Office Professional 7. The Microsoft Graph component used by Word and PowerPoint exactly mirrors Excel's charting features, while charting in SmartSuite uses

finer drawing to frames and presents drawing options via yet another interface. In Corel Office Professional 7, WordPerfect and Presentations provide identical drawing toolbars, but Quattro Pro uses something altogether different. Of

more than 60 preprogrammed macros. These "QuickTasks" make it easy for you to create mailing labels, draw up a budget, read user-defined Web sites, archive a set of files, and more. A number of these tasks involve more than one Corel application.



If you're using an address book, Word will ask you which address book you want to use and whose data you want on the label.



In this dialog box, you can tell Word whether you're printing to a label or to an envelope. The Options button lets you choose a label format.

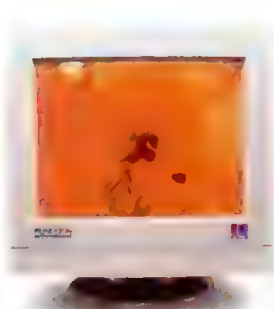
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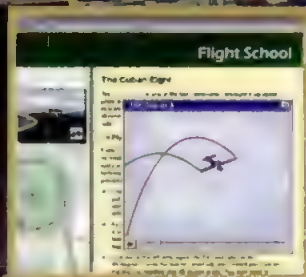
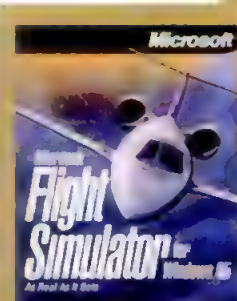
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INTERNET TOOLS

By Edward Mendelson

The rise of the Internet has forced the greatest transformation in office application suites since they were first introduced for the PC in 1989. Corel, Lotus, and Microsoft have revamped their suites from top to bottom to integrate desktop applications with files on the World Wide Web and to create HTML files as effortlessly as printed output. Each suite approaches the Internet from a different angle, and each has its

Web and save them in HTML format. In addition, every program in each suite includes an item on the Help menu that jumps to the vendor's Web site for online help. And Office Professional 97 and SmartSuite can display presentations through the Internet. But each one builds a different set of features on this foundation of Internet compatibility.

COREL OFFICE PROFESSIONAL 7

Corel Office Professional isn't merely integrated with the Internet—it also comes with everything you need to connect to and use the Internet. A copy of

Internet, through your default browser or through Corel's CompuServe forum via WinCIM, if you have it installed. And the suite applications can save files either in HTML format or in the Envoy portable-document format, which supports hyperlinks to remote Web pages. Users can view an Envoy document in any browser equipped with the free Envoy plug-in.

A QuickConnect application, included in the suite, displays a list of Web sites taken from your Netscape Navigator bookmark list, and a click on an item opens the site in Navigator. A QuickTask application, the control panel for a customizable set of predefined macros that operate across the suite, includes four macros that access the Internet. Two of these track stocks and other investments by capturing prices from the Internet and plugging them into a Quattro Pro spreadsheet. Another macro lets you specify Web pages that you want to browse regularly, and it jumps from one to the next in Navigator as you click on buttons that appear in a corner of your screen. A fourth guides you through the creation of a linked set of Web pages in WordPerfect. HTML editing features include tables but not forms or frames.

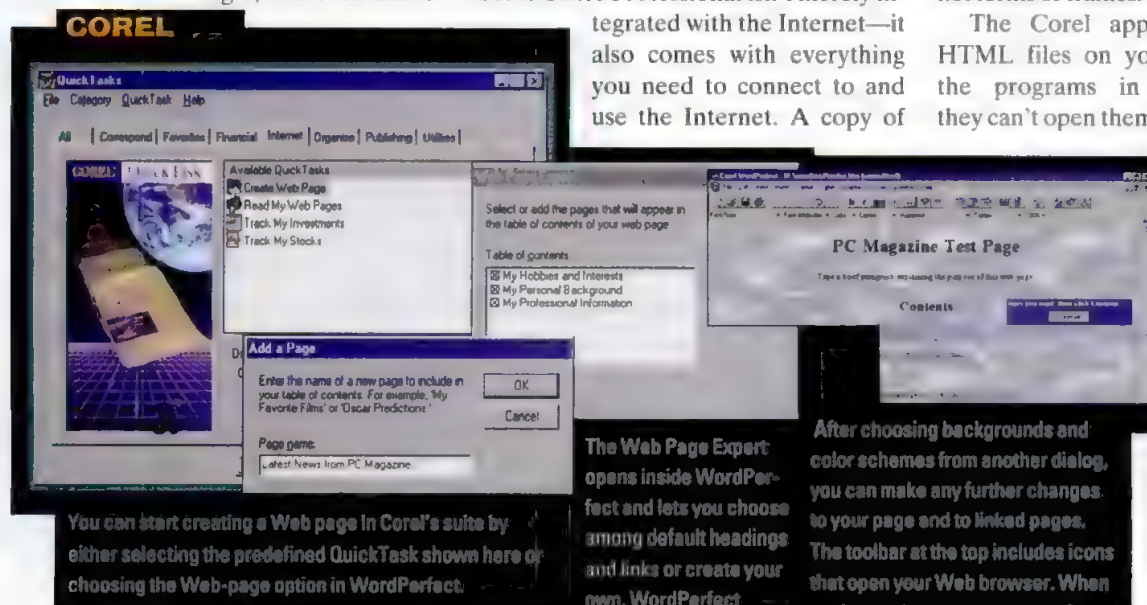
The Corel applications can open HTML files on your disk, but unlike the programs in the other suites, they can't open them from the Internet or

save them to a Web address.

When you create hyperlinks in any of the suite applications, the dialog box shows the address of the page currently displayed in Navigator and offers it as the link target. The same dialog allows you to format links as text, graphic buttons, or ordinary underlined text. Hyperlinks can connect

to remote Web pages or to other applications in the suite.

But the suite's most impressive Internet feature is Corel's innovative Barista technology. It allows WordPerfect, Quattro Pro, and Corel Presentations to create



own set of Internet-related strengths and weaknesses.

The word processor in Corel Office Professional 7, the word processor and spreadsheet in Lotus SmartSuite 97, and the word processor, spreadsheet, and presentation programs in Microsoft Office Professional 97 can open files from the World Wide

Netscape Navigator 2.02 comes in the package, although the installer will intelligently refrain from overwriting any later version on your disk. You can configure the suite to connect with help from the

The Web Page Expert opens inside WordPerfect and lets you choose among default headings and links or create your own. WordPerfect automatically creates a separate page for each link you create.

After choosing backgrounds and color schemes from another dialog, you can make any further changes to your page and to linked pages. The toolbar at the top includes icons that open your Web browser. When you're ready to save your set of pages, click on the Continue button.

A large dandelion seed head is in the foreground on the left. The background is a green field with a faint, glowing circuit board pattern. The sky is blue with a few dandelion seeds floating in the air.

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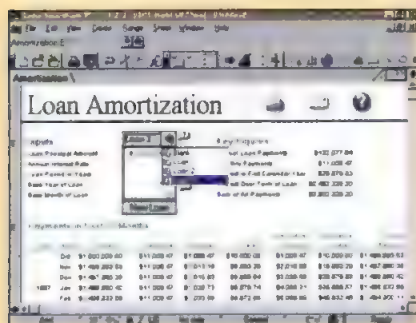
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Spreadsheets: Next Year's Number-Crunchers

By Craig Stinson

New-found Internet connectivity and enhanced collaboration tools emerge as the most notable elements in the three major suites' latest spreadsheet programs. Lots of new usability features also appear in these applications.

Lotus 1-2-3 97 adds a friendlier face to the program's unique Version Manager. An "assistant" walks you through the setup and analysis of versions. A



Lotus 1-2-3 97 offers a more accessible Version Manager. The gray box and drop-down list make it easy to find and switch between versions.

new display element leads your eye directly to cells containing the names of different versions, shows the name of the current version, and lets you move between versions by clicking on a drop-down arrow.

A new TeamReview feature works hand in glove with Version Manager, allowing you to send ranges to VIM-, MAPI-, and CMC-compliant e-mail addressees, either sequentially or as a broadcast. Recipients can return comments and/or alternative values, and Version Manager can automatically incorporate the returned values to produce alternate versions of the original document. New buttons in 1-2-3's file management dialogs and a new TeamConsolidate tool simplify connectivity between the spreadsheet and Lotus Notes.

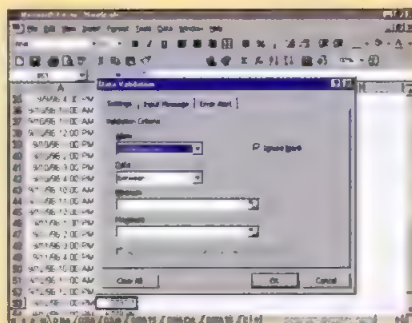
Usability enhancements include an interactive Print Preview, which updates itself automatically as you make changes to the worksheet, and a clever totaling command that can

automatically add @SUM formulas to the adjacent columns. For developers, Lotus 1-2-3 now includes a well-appointed Independent Development Environment (IDE) and support for LotusScript.

Among its new features, Microsoft Excel 97 offers a powerful pivot-table facility, a simplified charting interface, new data validation and conditional formatting features, and support for shared workbooks. Pivot tables, Excel's unmatched multidimensional reporting feature, can now include calculated fields. A new data validation feature not only allows you to restrict data entry to particular data types and values, but also easily allows nonprogrammers to furnish input ranges with drop-down pick lists of permitted entries.

Microsoft has expanded the shared list feature of Excel 95 to encompass whole workbooks in Excel 97. In a shared workbook, multiple users can change values, formulas, and formatting, as well as filter the worksheet independently to view areas of interest—but you can't restrict a range or restrict access to a file. Excel also keeps a history of which users changed what.

On the usability front, Excel offers



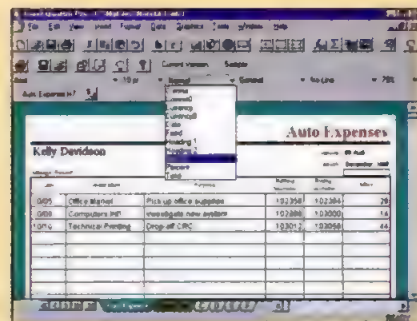
Excel's new Data Validation feature lets you specify an acceptable data type, a valid range of values, instructions to an end user, and an error message—all without macro programming.

automatic correction for certain common formula errors. For example, you can use row and column headings to construct plain-English formulas even

if you don't bother to name ranges. And users with Microsoft's new IntelliMouse will be able to scroll, pan, and zoom without using scroll bars or toolbar buttons.

Corel's Quattro Pro 7 introduces a menu layout that aligns it with other members of Corel's suite, and it takes advantage of WordPerfect's admirable file dialogs. Quattro Pro's new support for PerfectScript enhances Corel's suite compatibility, and the program's macro recorder gives you the option of recording in the previous version's macro language or in PerfectScript.

Version 7 adds more than 100 new functions to Quattro Pro's library, far



Quattro Pro's revised user interface includes a WordPerfect-like Power Bar, with drop-down lists of formatting options.

more than its competitors have. New functions include the ability to create subtotals and grand totals (totals of subtotals), and to sum only the negative or positive values in a range. Version 7 also presents a feature called Fit-As-You-Go, which automatically expands a column's width as needed.

Like Lotus 1-2-3 and Excel, Quattro Pro now offers data mapping, automatically parses incoming text files, allows you to create template files, supports Notes/FX, answers plain-English help queries, corrects commonplace spelling errors as you type, and lets you customize toolbars with simple mouse actions. Corel is clearly moving up to speed with its spreadsheet application.

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- Family Pak includes: ABC by Dr. Seuss; Thinkin' Things® Collection 1; Earthworm Jim™; and Mechwarrior™ 2
- Microsoft Home Pak includes: Works 4.0; Publisher Deluxe; Encarta™; CD Sampler; plus more
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- 28.8 fax/modem, speakerphone, voice mail
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- PCI 64-bit 3D video, MPEG, 2MB EDO RAM
- 17" Micron 17FGx, .28dp (15.8" display)
- Tool-free minitower or desktop
- Microsoft Mouse, 104-key keyboard
- Microsoft Windows 95 & MS Plus! CD
- Microsoft Office Pro 95 & Bookshelf® 95 CDs
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- Family Pak includes: ABC by Dr. Seuss; Thinkin' Things Collection 1; Earthworm Jim; and Mechwarrior 2
- Microsoft Home Pak includes: Works 4.0; Publisher Deluxe; Encarta; CD Sampler; plus more
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January 9, 1998
Millennia P166



June 25, 1998
Millennia P200



June 25, 1998
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August 1998
TransPort P166



May 30, 1995
Millennia P120



May 16, 1995
Home MPC P133



January 1996
Millennia P133



April 1996
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May 1996
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December 1995
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Microsoft
Windows 95

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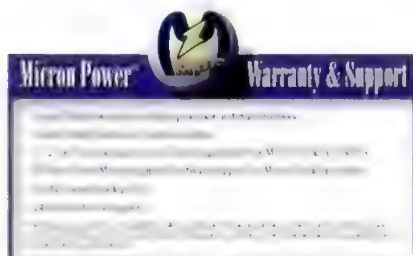
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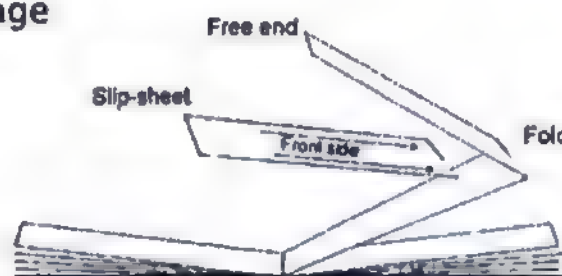


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Foldout slip-sheet



GbsSlipSheet-001

Inverted Foldout slip-sheet

Folded edge of the page

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2. Arrow pointing to the fold

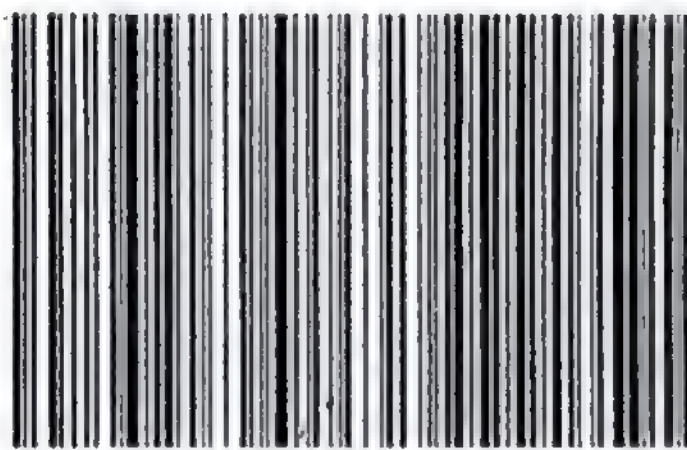
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4. Close the page and slip-sheet



1. Follow instructions on the other side

Inverted Back

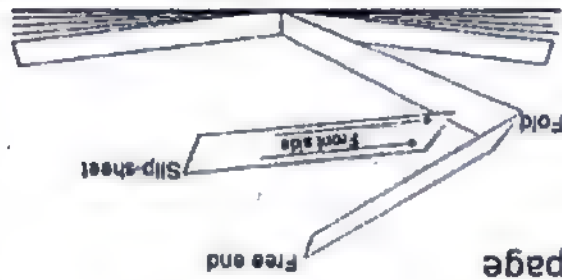


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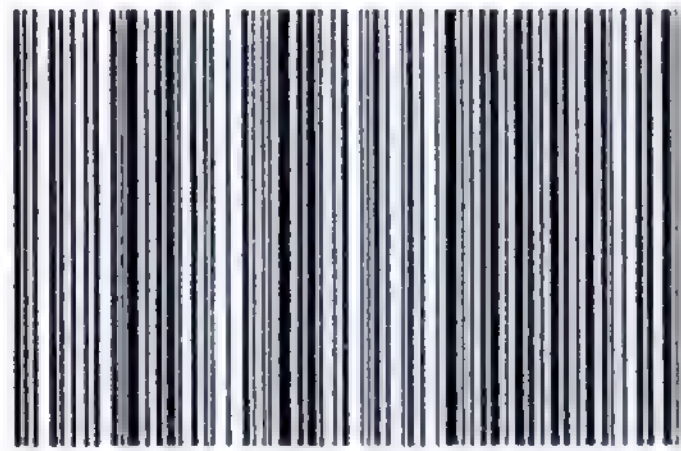
Back

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Inverted Foldout slip-sheet

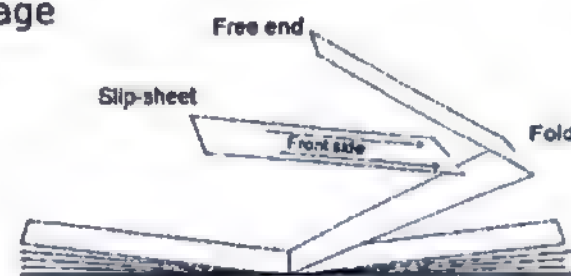


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Folded edge of the page

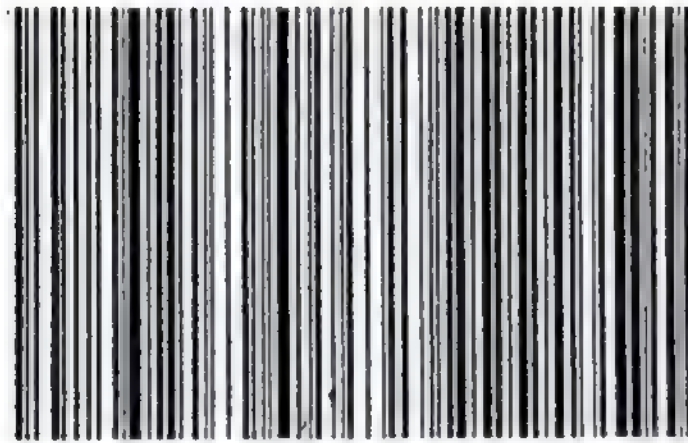
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3. Slice the folded edge
4. Close the page and slip-sheet



1. Follow instructions on the other side

Inverted Back



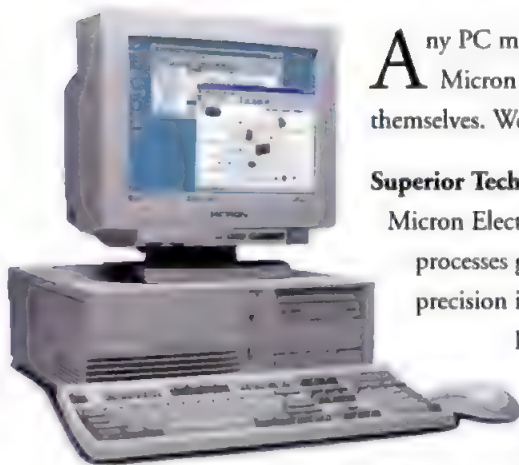
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† 6.9 lbs. includes 3.5" floppy and one battery
 † Lock secures both Millennia Transport and MicronDock



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- 1.3GB removable hard drive

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\$5,199 Business lease \$163/month

- 150MHz mobile Intel Pentium processor
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- Samsonite® leather carrying case

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- With 2nd hard drive (2.1GB).....add \$699
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- Dual Pentium Pro ZIF sockets
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- 8X SCSI-2 CD-ROM drive
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- 64-bit 1MB ISA video
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- Full-size tower with 10 drive bays
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- Microsoft Mouse, 104-key keyboard
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- NOS support (3 resolutions)
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- PCI 64-bit 3D video, MPEG, 4MB EDO RAM
- Tool-free mini tower or desktop
- Microsoft Mouse, 104-key keyboard
- Microsoft Windows NT Workstation 4.0 CD
- Microsoft Office Pro 95 & Bookshelf 95 CDs
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 • 14" Micron 14FGx, .28dp (12.9" display)
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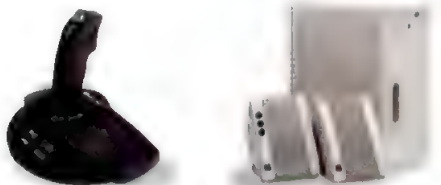
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(upgrade from systems with standard 12X EIDE CD-ROM drive)
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- Iomega 6-pak of 100MB Zip cartridges.....\$99
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- 28.8kb V.34 internal data/fax modem.....\$139***
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- SMC ISA TokenCard network card.....\$199

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- ** Requires SCSI Host Adapter
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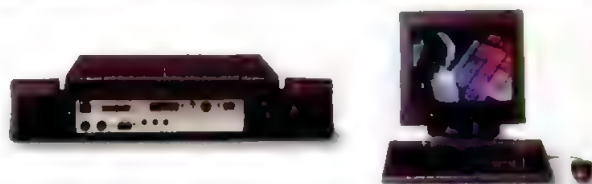
- Edventure Pak, including: Shello Ray, the Brave; Putt-Putt® Saves the Zoo™; Reader Rabbit's Reading Development Library™ 1; Froddi Fish™ and the Case of the Missing Kelp Seeds™; and the Thinkin' Things™ Collection 2.....\$49

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- 17" Hitachi SuperScan 1711 (15.9" display) .26dp color monitor.....\$150 ††
- 21" Hitachi SuperScan 2111 (20" display) .26dp color monitor.....\$650 ††
- #9 Imagine 128 series II video card w/4MB VRAM.....\$500 †††
- #9 Imagine 128 series I video card w/8MB VRAM.....\$750 †††

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- MicronDock™ multimedia port replicator: Ethernet 10BT LAN adapter, SCSI-2port, S-video and NTSC-video output, built-in stereo speakers, infrared port, headphone, microphone, line-in jacks, parallel, serial, VGA and 2 PS/2 ports.....\$299
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COVER STORY

Application Suites

Web pages with all the formatting and fonts that these programs can print on paper. In an HTML page saved using Barista, Java code displays the original formatting in any Java-enabled browser (including Netscape Navigator and Microsoft Internet Explorer) without requiring a plug-in or any other additional software. Corel has announced a version of the suite written entirely in Java, for the first half of 1997.

LOTUS SMARTSUITE 97

Lotus SmartSuite pioneered Internet integration in SmartSuite 96, the first Windows 95 version of the software, and it expands this capability in SmartSuite 97. Some features employ the user's default browser; others use the Webster Web browser OCX, which is installed automatically. The Internet folder in the SmartCenter control panel uses the Webster browser to retrieve headline news, stock quotes, and weather. It uses your default browser to open pages you've designated as your bookmarks or Favorites, or any other page you choose. Special dialog boxes for opening and saving from the Internet let you specify default FTP and WWW servers. With an Internet toolbar included in all the applications, you can select text in your document and have the program go to an Internet search page to find pages that refer to that text.

Word Pro 97's Web Publisher, a set of toolbars and menus for creating Web pages, includes a well-designed set of click-and-edit templates, complete with HTML tables. OCX controls allow you to create HTML forms, although if you intend to use a form with a CGI script, you'll probably have to complete the coding by hand. Freelance Graphics can translate presentations into HTML, em-

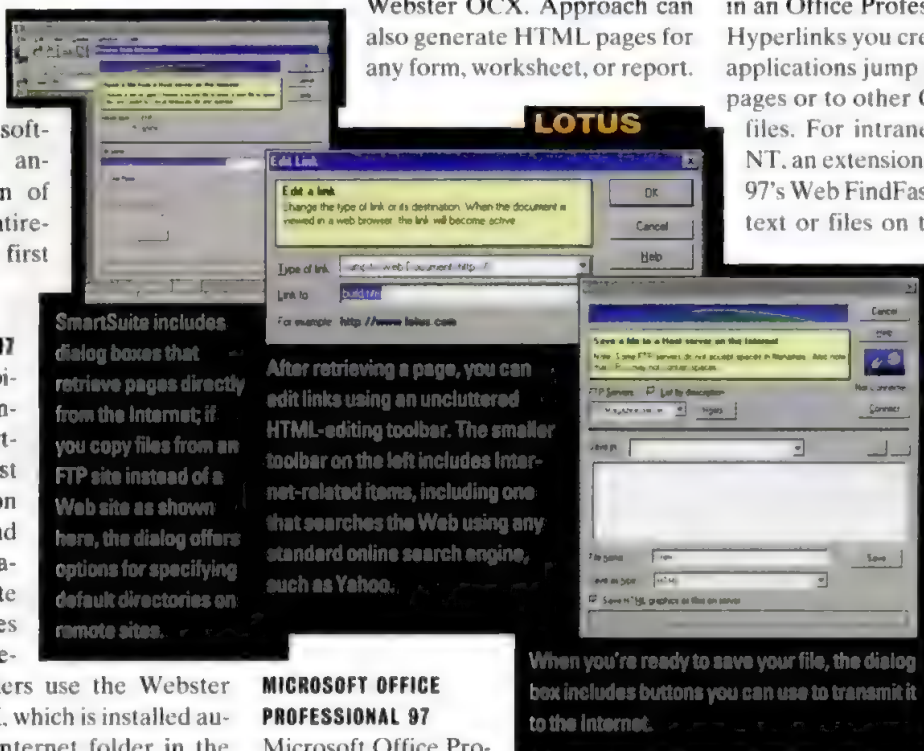
playing frames and a navigation bar to help viewers move from slide to slide. Approach 97, like the previous version, includes a database of popular Web sites; it lets you open them either in your default browser or within Approach using the Webster OCX. Approach can also generate HTML pages for any form, worksheet, or report.

suite includes many of the icons from IE3's toolbar. When you click on the home page icon, your default home page opens for editing in the current application; also, a Favorites list lets you open any of your bookmarked pages from within an Office Professional 97 application. Hyperlinks you create in any of the suite applications jump either to remote Web pages or to other Office Professional 97 files. For intranets built on Windows NT, an extension to Office Professional 97's Web FindFast program searches for text or files on the network, using an index created on the server.

Word's Web page wizard includes templates for standard page types, including feedback and other forms that use tables but not HTML frames. You can also insert HTML form controls into your document. Word now adds an Online view to its familiar Normal, Page, and Outline views, so that the window displays your page as it will likely appear when users view it in a browser. The Online view automatically displays a list of headings in a separate panel.

Not only will users be able to create their own Web sites using PowerPoint's new Home-Page template, but they'll also be able to save their presentations in HTML. And a special browser plug-in, the PowerPoint Animation Player, will let users display presentation animations on the Web. You will also be able to augment the included clip-art collection by visiting Microsoft's Web-based clip-art library, Clip Gallery Live.

Access 97 can save static tables and reports in HTML format, and the Publish to the Web Wizard allows a live database to be accessible from the Web.



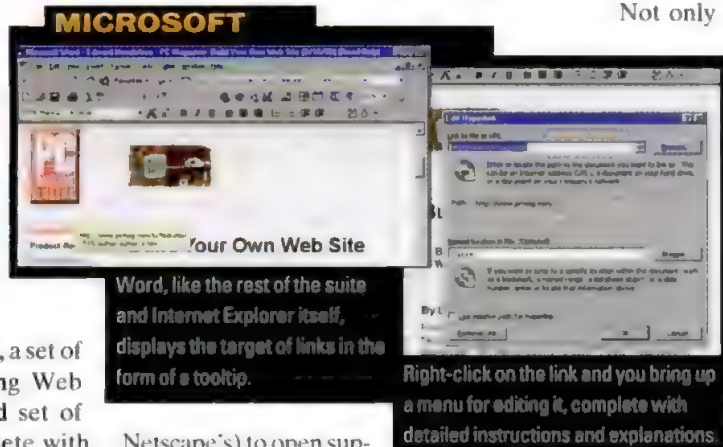
SmartSuite includes dialog boxes that retrieve pages directly from the Internet; if you copy files from an FTP site instead of a Web site as shown here, the dialog offers options for specifying default directories on remote sites.

After retrieving a page, you can edit links using an uncluttered HTML-editing toolbar. The smaller toolbar on the left includes Internet-related items, including one that searches the Web using any standard online search engine, such as Yahoo.

MICROSOFT OFFICE PROFESSIONAL 97

Microsoft Office Professional 97 comes with a copy of Microsoft's Internet Explorer 3.0 (IE3), and many of the suite's Internet integration features require it. But the Help menus use your default browser (which can be

When you're ready to save your file, the dialog box includes buttons you can use to transmit it to the Internet.



Word, like the rest of the suite and Internet Explorer itself, displays the target of links in the form of a tooltip.

Netscape's) to open support pages on the Internet. If you have Word 97 and IE3 on your disk, click on the edit button on IE3's toolbar; the program will copy into Word the page currently open in the browser, for you to edit or save.

A Web toolbar used throughout the

Right-click on the link and you bring up a menu for editing it, complete with detailed instructions and explanations.



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COLLABORATION TOOLS

By Ben Z. Gottesman

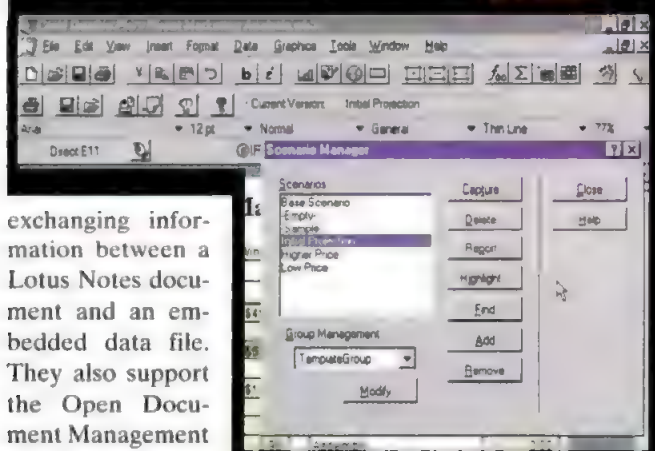
It seems that everyone's on a network these days. Whether it's a local area network or the Internet, one way or the other you're connected. But too often, working together on documents still means paper, highlighters, and colored pencils. The suite vendors have long realized that people could collaborate more efficiently on PCs. Nearly all of the suites' applications incorporate tools to help users work together.

For several versions now, all three of the suites in this story have allowed you to mail documents directly from applications to other users using standard mail protocols, such as MAPI and VIM. In addition, the products in the Microsoft and Lotus suites can route documents from one user to another via e-mail. All of the suites also support Notes/FX, a tool for

COREL OFFICE PROFESSIONAL 7

Back in the days when WordPerfect owned much of the contents of the present Corel suite and sold it as Borland Office 2.0, this suite was a leader in collaborative computing through an innovation called *Object Exchange*, or *OBEX*. By employing OBEX, users could distribute portions of a document (such as pages in a spreadsheet) across a multitude of electronic mail systems and could track and consolidate changes. OBEX never really caught on, and since then this suite has placed much less emphasis on collaboration.

COREL



Corel Quattro Pro's Scenario Manager lets users track multiple versions of a spreadsheet.

exchanging information between a Lotus Notes document and an embedded data file. They also support the Open Document Management API (ODMA), which eases integration with document management systems.

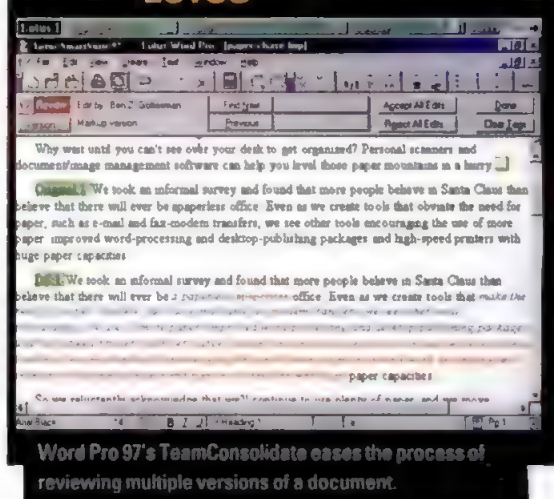
different colors to each editor.

Corel Office Professional 7 includes a client license for Novell's GroupWise, which makes the suite more multiuser-friendly if your organization uses the Novell program. GroupWise includes calendaring and scheduling, and the latest version incorporates Novell's SoftSolutions document manager.

LOTUS SMARTSUITE 97

Leveraging its success in the workgroup market with Notes, Lotus made a big push for its Team Computing with the release of SmartSuite 96. Word Pro, Freelance, and Approach added several new tools to facilitate working together electronically. In Lotus's SmartSuite 97, these features continue with only minor

LOTUS



Word Pro 97's TeamConsolidate eases the process of reviewing multiple versions of a document.

The current Corel suite lacks any sort of routing capability. Corel Presentations, while significantly upgraded in this latest release of the Corel suite, has no tools for presenting across a LAN, a modem, or the Internet. Quattro Pro is the only application in the suite that supports versioning (via the Scenario Manager), although WordPerfect can track changes to a document, assigning

enhancements, and the new 32-bit 1-2-3 joins the Team Computing fray.

The first in the line of Team Computing features is Lotus's TeamMail, a tool for mailing files to multiple users either all at once or in a serial route. The sender can create custom messages for each person on the list. TeamMail is in all of the SmartSuite applications, including the screen-activity recording tool, ScreenCam.

The TeamReview feature in Word Pro, Lotus 1-2-3, and Freelance Graphics is similar to TeamMail, but you use it for distributing documents for comments and changes and then coordinating them. This process varies from application to application. You can choose to distribute TeamReview documents in Word Pro and Freelance via e-mail or

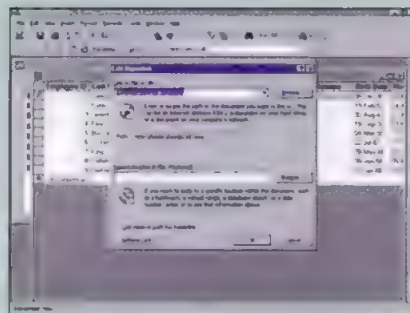
Databases: The Future of Data Navigation

By Stephen W. Plain

Microsoft Office Professional 97 and Lotus SmartSuite 97 will both include new versions of their database applications—Microsoft Access and Lotus Approach, respectively—that will focus on usability and on Internet connectivity improvements. Paradox 7 for Windows 95, the database application included in Corel Office Professional, is powerful in its own right but does not yet include Internet-specific features.

Access 97 will include a new hyperlink data type that will let you store URLs as a field in your database tables and smoothly integrate HTML documents with your forms. A hyperlink field can be linked to a page on the Web, to a locally stored HTML file, or even to a particular bookmark within an HTML document. Whenever a hyperlink field is used on a form or in a datasheet view, one mouse click will launch your browser to load the file. Access 97 will also have features that will let

and report wizards will all be improved to allow greater flexibility; the Office Assistant will be included; and all forms will have a Filter by Form mode. The new Jet 3.5 database engine will also allow partial replication of databases and include locking improvements for a performance boost. Access supports full OLE (server and container). And for seri-



Access 97 introduces a new hyperlink data type, enabling you to store URLs directly in your database. Hyperlink fields appear in forms as clickable HTML hyperlinks.

ous developers, it will support VBA 5.0 and provide an interface to source-code control products like PVCS and Visual SourceSafe.

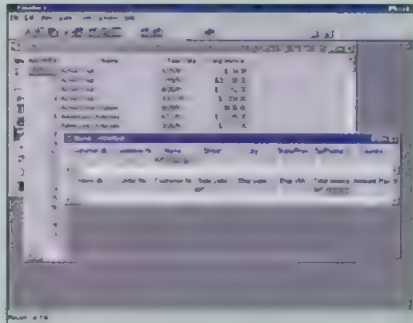
Lotus Approach 97 Edition for Windows 95 will also include facilities to pass data to and from the Web. A new File Open/Save object that uses FTP to save and open documents across the Internet will be added to the LotusScript object model. Approach 97 will let you save views or data to remote .APT files that other users can retrieve and browse as read-only information. You'll also be able to save worksheets, forms, and reports to HTML format and, in the case of reports, to .RTF and plain text as well.

In addition to providing the program's traditional macros, Approach 96 added support for LotusScript. In Approach 97, users can actually record LotusScript, using the Record Transcript function, instead of only coding manually. Of course, the new

LotusScript Independent Development Environment (IDE) will be included for writing code. The new version of Approach will also allow the importing of QMF queries and forms and will contain support for DB2 BLOB fields.

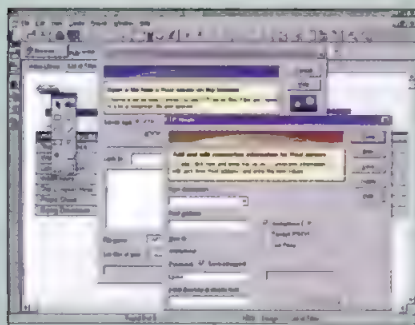
Borland's Paradox 7 for Windows 95, included in Corel Office Professional 7, has been on the market for some time. Though it doesn't provide Internet functionality, it is a powerful addition to the Corel suite. Paradox 7 uses a mature visual development architecture and a powerful QBE interface to the Borland Database Engine (BDE). BDE supports Paradox and dBASE file formats natively, as well as remote SQL database via additional drivers. Paradox is marketed as companion product to Borland's Delphi development tool, which also relies on BDE.

Paradox 7 introduced OCX (now called ActiveX) support, which may be used as a mechanism to introduce Web functionality into your Paradox applications today. A number of third-party ActiveX components already provide browser and



Paradox 7 sports the product's hallmark feature: an easy-to-use query-by-example interface for building even complex queries quickly.

Winsock functions. Paradox 7 is not as closely integrated with the other Corel suite products as Access and Approach are with their respective suitemates, but it offers powerful database performance and a user-friendly interface.



Approach 97 includes a new opening and saving mechanism that lets you open remote files via FTP as easily as you can locally stored files.

you save your data and reports as HTML documents as well as interface your databases with Microsoft's Internet Information Server and Personal Web Server products. You'll also be able to attach to tables in HTML documents, just as you now can with remote database tables.

Access will also feature improved usability and power. Database, form,



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floppy disk, or you can store them in a Notes database or on a file server. Users of Lotus 1-2-3 can distribute data via mail or store files in Notes.

In Word Pro, a document's author can decide who can access the document as well as what sort of changes that person can make. For instance, a document can be read-only, not savable under an alternative name, or not editable as to its styles; alternatively, you may allow a reviewer full access rights. You can set rights globally or person by person. You can then use TeamConsolidate in order to compare all the suggested changes on a single screen.

In Freelance Graphics 96, document reviewers employing TeamReview could only annotate documents, using various drawing tools available in Freelance. The originator could view everyone's changes together or individually and accept or reject them. In Freelance Graphics 97, reviewers can modify a presentation's content.

Lotus 1-2-3 users can also employ TeamReview to distribute portions of a spreadsheet. Lotus will provide a Lotus Notes template with SmartSuite 97 so users can make Lotus Notes the central repository for shared worksheets. In addition, Word Pro and 1-2-3 support versioning within a single file, allowing you to store multiple iterations of a file in one place. Users can go back to any version at any time.

Freelance's tool for giving presenta-

With Lotus's TeamMail, users can distribute a document, spreadsheet, or presentation to others all at once or one at a time.

tions across a network, TeamShow, now enables multipoint presentations and includes improved support for running presentations across the Internet. And you can also use Lotus Organizer as a group calendaring and scheduling application.

MICROSOFT OFFICE PROFESSIONAL 97

Prior to Office Professional 97, Microsoft treaded lightly in the area of collaboration. It has given the suite mail

Microsoft Excel's Shared Workbooks feature shows a user the changes made to the spreadsheet by others working on it at the same time.

capabilities, including support for routing, and has added Schedule+ in the previous version of the suite. The upcoming version, Microsoft Office Professional 97, should make it a much more enticing collaboration product, especially for users of Microsoft's Exchange server

groupware application.

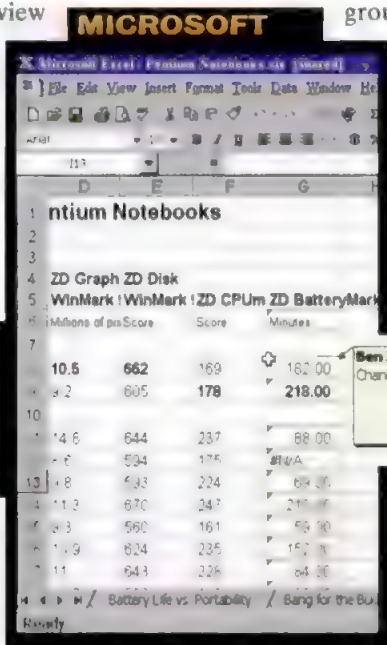
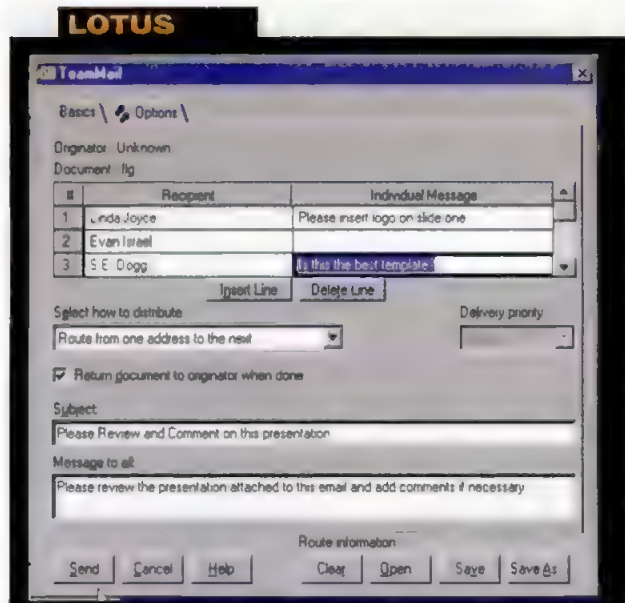
Whereas Lotus's SmartSuite incorporates tools that allow multiple users to work only on copies of documents, presentations, or spreadsheets for later consolidation, Microsoft's Office Professional is going to allow simultaneous multiuser editing of Excel spreadsheets. And the program will provide a variety of tools for tracking changes and managing conflicts. This new Shared Workbooks feature will work only with spreadsheets stored on a file server, not with files stored in other repositories, such as Exchange public folders, Notes databases, or HTML pages.

Some of Microsoft Office Professional 97's other collaborative tools include versioning in Microsoft Excel 97 and Microsoft Word 97 and Microsoft PowerPoint 97's Presentation Conferencing, which is similar to Lotus SmartSuite's TeamShow tool (found in Freelance) for presenting to multiple users on a LAN.

Early versions of Microsoft Office shipped with Microsoft Mail, but Schedule+ replaced it in the version prior to this one. In Office Professional 97, Microsoft replaces Schedule+ with Outlook, a combination mail client, scheduler, and contact and task manager that Microsoft calls a Desktop Information Manager (DIM). Outlook also replaces the Exchange mail client.

Although Outlook is a universal mail client, it requires Microsoft Exchange server for most of its workgroup aspects. Outlook has very customizable views and forms, and it supports VB Script, a Visual Basic subset. In addition, Outlook forms can serve as containers for data files from the other Office applications (as well as other OLE objects) and can extract data from these objects' properties.

Microsoft's new groupware tool Team Manager, while not part of the suite, is a member of the Office family of products. With its Gantt chart-style interface and task organization functionality, Team Manager bears some resemblance to a project management application, but it should also be suitable for mainstream work environments. Microsoft will closely tie Team Manager's features to Outlook's task management tools.



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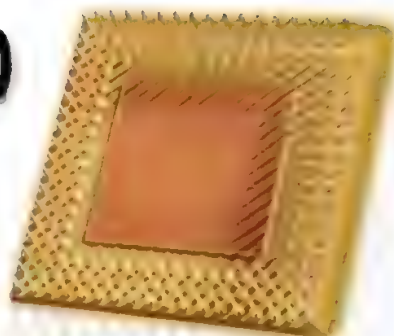


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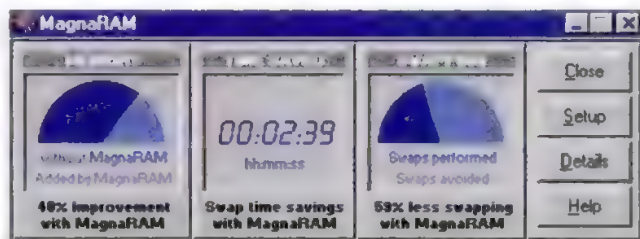
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PROGRAMMING TOOLS

By Stephen W. Plain

Suite applications have always included their own macro languages to automate common tasks. All of the major suite products are now reaching a new plateau in programmability.

Today, all of the major applications are moving toward including cross-application compatibility as a chief element. Suites are also beginning to include integrated development environments (IDEs), which allow programmers to write and debug code as productively as with traditional development tools. A shared IDE provides a single interface for writing code in all of a suite's applications, a necessity for creating several routines in a coherent fashion. Such IDEs can also include object browsers and command

usage help that let you inspect available objects and properties.

These programming tools use suite-based code, so users must have a suite installed on their systems to run a program written in the suite's language.

COREL OFFICE PROFESSIONAL 7

Corel's Office Professional 7 uses PerfectScript as the common language for its core applications: WordPerfect, Quattro Pro, and Presentations. It's the only suite in this story, however, that doesn't support its own programming dialect, PerfectScript, in its database, Paradox 7. Office Professional has several programs, besides Paradox, that do not use PerfectScript: information managers Info-

technique, so it's relatively easy to use for basic task automation. It differs from Visual Basic for Applications (VBA) and LotusScript in that it doesn't have its own full-fledged IDE. Instead, the scripting language enables you to manage recorded macros. To create a new macro, you can use the PerfectScript accessory application or the current application's standard Record Macro command, which runs PerfectScript behind the scenes. As the macro is recorded, you can perform operations in any of the three core applications. Once an application is saved, you can edit it in WordPerfect or any application that reads WordPerfect 6 files.

The Dialog Editor contains dialog windows associated with the loaded macro. PerfectScript dialogs are more difficult to link to scripts than VBA and LotusScript forms, which let you attach event scripts directly to the events of a dialog's control. PerfectScript dialogs require more coding.

Both Corel Office Professional and Corel Office also come with the PerfectFit Software Developer's Kit (SDK). You can use it to create add-in products that integrate smoothly into the suite.

LOTUS SMARTSUITE 97

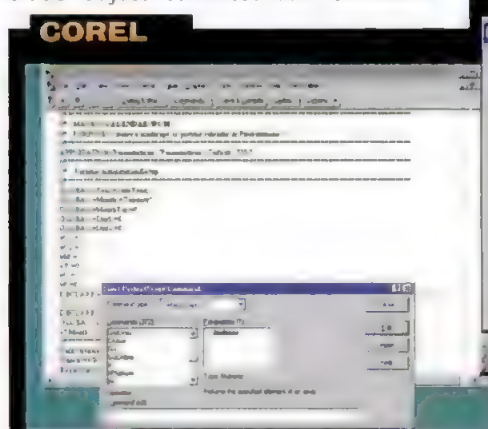
While Microsoft Office Professional 97 may have the lead in programmability, Lotus SmartSuite 97 is hot on its heels. SmartSuite's core language, LotusScript,

is a version of Basic designed to resemble VBA quite a bit, and the product's IDE is also similar to VBA in some respects. LotusScript is available in SmartSuite's

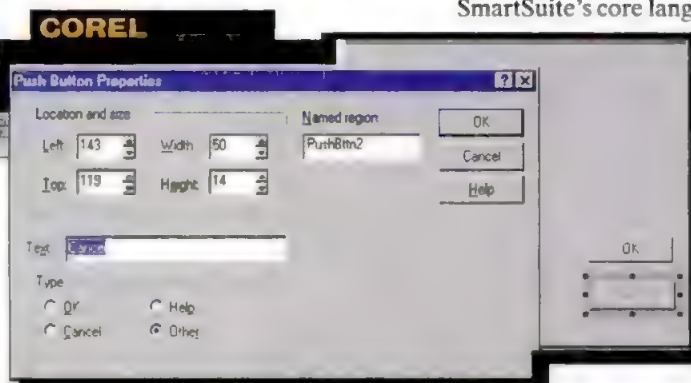
core applications: Lotus 1-2-3, Word Pro, Freelance Graphics, and Approach.

LotusScript uses the same object-oriented notations as VBA, a method that not only makes a transition from Office to SmartSuite relatively simple but also makes it very easy to control SmartSuite from within a Visual Basic project.

COREL



Corel's PerfectScript bucks the Basic trend with a more proprietary dialect. Although there is no dedicated IDE for PerfectScript, recorded macros may be edited within WordPerfect with a custom toolbar that aids you in your coding.



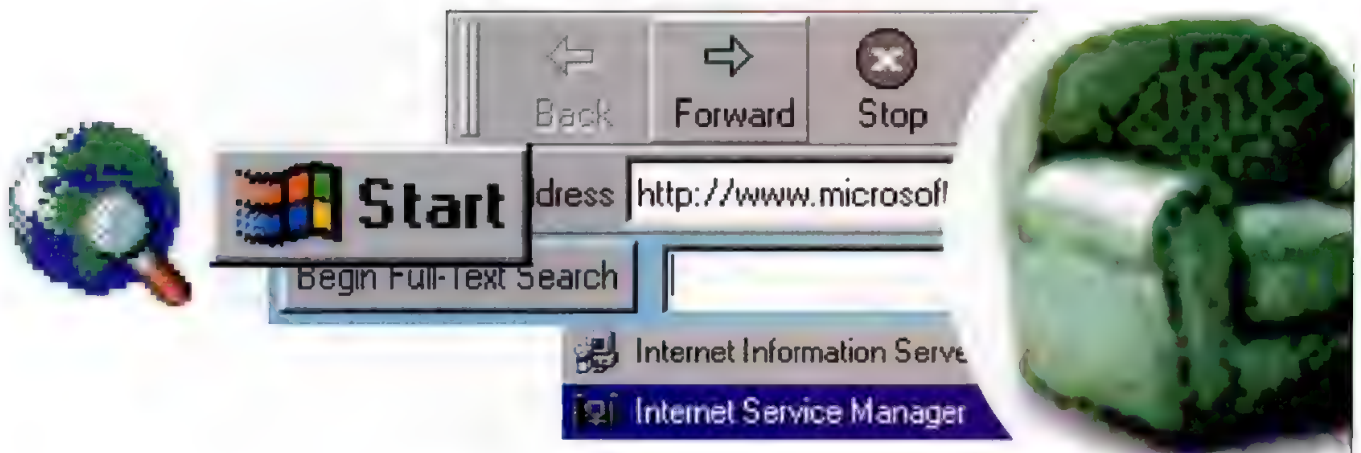
The PerfectScript Dialog Editor can be used to create custom dialogs, but it is not as productive as the VBA and LotusScript versions.

Central (also originally from WordPerfect) and Sidekick 95 (from Starfish Software), and CorelDraw 6.

PerfectScript is designed around the traditional record-and-play

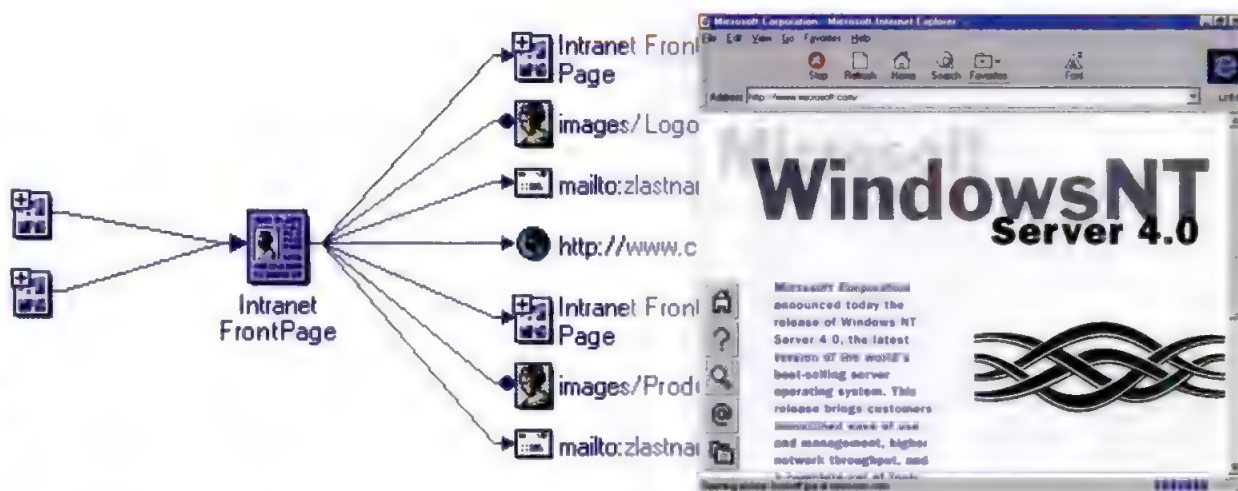
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of course, Windows NT Server supports all standard **Internet protocols** so you're never locked in or left out in the Internet cold. Windows NT Server 4.0 performance is better too: It offers over twice the network throughput and is 35% more scalable than Windows NT Server 3.51. Most importantly, Windows NT Server is easy to use. With features like the **Windows® 95 interface** and **wizards** that automate common administrative tasks, you can move on to more important things, like lunch. If eating somewhere other than at your desk sounds like something you'd be interested in, take a closer look at Windows NT Server 4.0 at our Web site.

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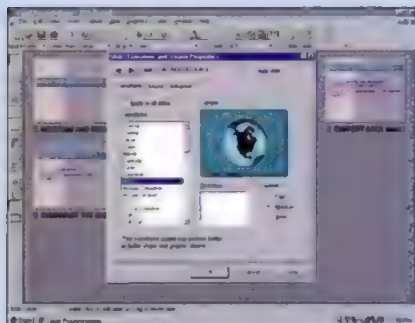
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Presentation: The Show-Me Tools You'll Use in '97

By Wayne Kawamoto

The suites' new crop of presentation programs all come with improvements and advances, particularly with respect to support for multimedia and the Web.

Corel Presentations 7's new high-impact slide-show effects let you choose from 40 new screen transitions, including a mosaic that blurs and then



Corel Presentations 7 comes with new transitions and object animations.

focuses in a transitional slide, and a variation on classic screen wipes called Stretch and Push-Away. To make your presentations move, you can apply predefined animation paths to objects and bullet points so they fly or bounce onto the scene from any direction. And Presentations now lets you map images onto backgrounds. The program features improved organizational charting capabilities that make it easier to create and edit charts.

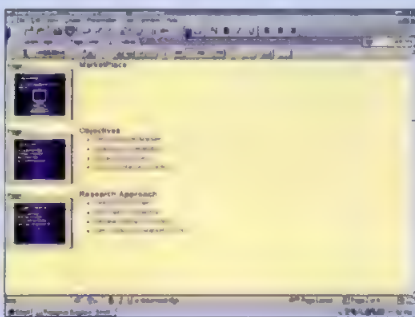
Increased Web support includes Internet features that let you link slideshows to URLs and convert presentations into HTML. Most notably, though, Presentations will use Corel's new Barista technology to output Java-based slide shows that will maintain the look and feel of the original documents. When performing conversions, you can opt to create navigable Web documents that let users select which slides they wish to view.

To make it easier to create and edit presentations in the upcoming Lotus Freelance Graphics 97 Edition, you'll find 14 new SmartMaster templates for

building multimedia slide shows. And with Freelance's new Web support, you can convert presentations into Web documents, complete with a table of contents, built-in links, and support for Netscape Navigator frames.

Users can also assign functions, such as launching a URL, to presentation objects in Lotus SmartSuite 97. And the program's improved TeamShow feature will deliver slide shows to multiple systems by way of the Internet or, as in the current version, via LAN, modem, or serial cable.

New enhancements in Microsoft PowerPoint 97 should make it easier to create attractive presentations, as well as publish to the Web. To quickly build new presentations based on existing ones, a Slide Finder feature will help you search for, preview, and copy slides from existing presentation files.



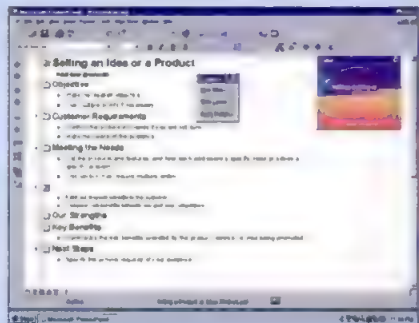
Lotus Freelance Graphics 97 will display a thumbnail slide while you edit in the outliner.

To tailor presentations for different audiences, PowerPoint will let you build and customize several distinct versions of a presentation, without creating multiple presentation files. And when you make changes in the outline view, PowerPoint will display a thumbnail slide that updates it with your changes. The program automatically creates a summary slide listing all of the slide titles at the end of your presentation. Microsoft's PowerPoint 97 will also link computers through a serial cable, so you can display your notes on one PC and the slides for the audience on the other.

More comprehensive Web support will allow you to export presentations as HTML files, and will also come in the form of tools that can add buttons your audience can push, so they can navigate on their own through presentations. Building on this capability, PowerPoint will record narrations and voice-overs, and play them back.

Other new Web features will allow PowerPoint presentations to link with URLs and to create standalone animations that can run on Web browsers via a plug-in called the PowerPoint animation player. There will even be a special template for building home pages.

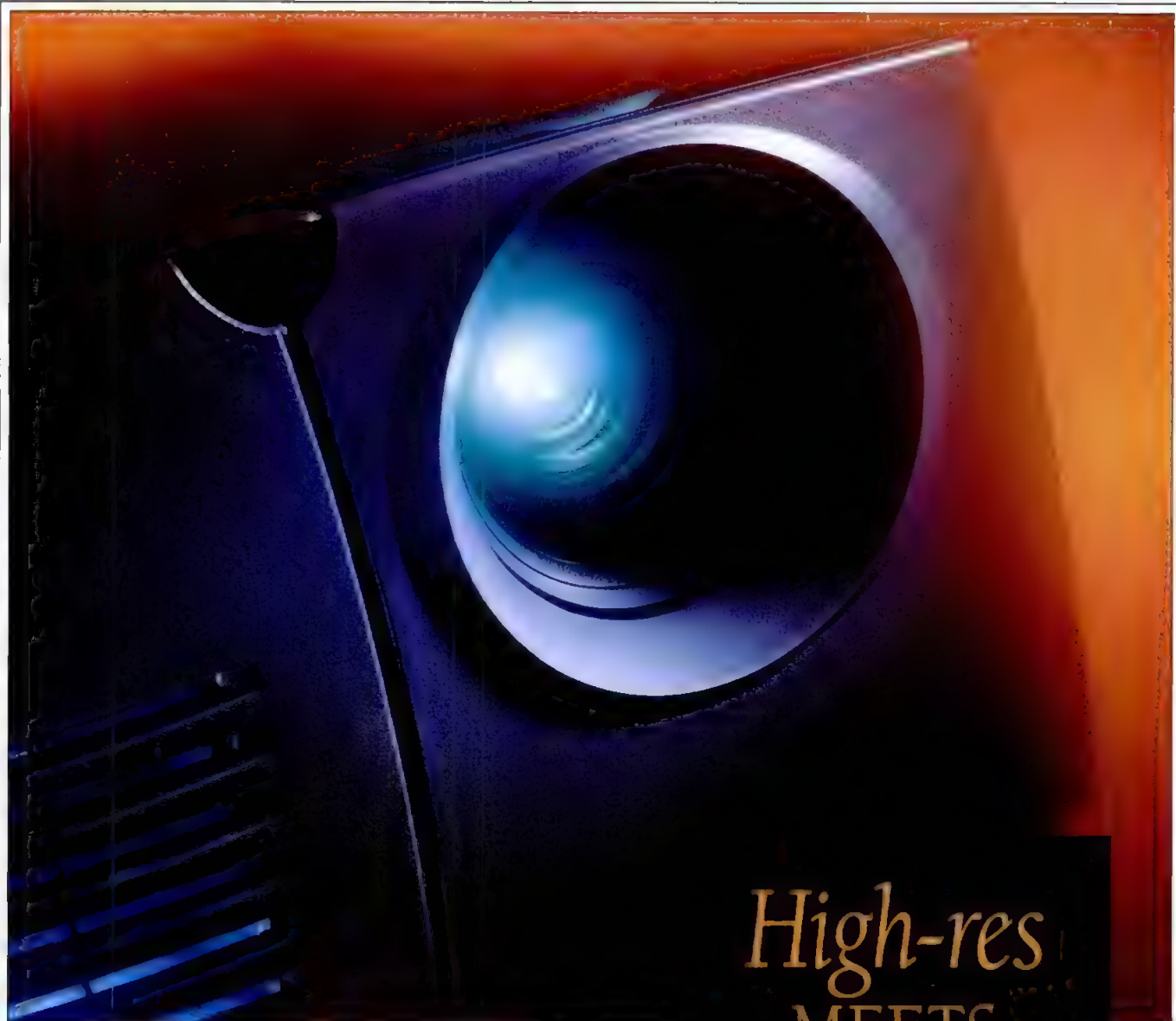
Drawing from the suite's new graphics tool, Office Art, PowerPoint will be able to create flowcharts with linking connectors that stay in place during edits. It will work with Bezier curves and 3-D objects, even those with shadows and textures. The suite will also provide an extensive clip-media collection with over 3,000 images, audio files, and video files.



PowerPoint 97 features templates designed by Dale Carnegie Training. PowerPoint 97 also updates a thumbnail slide as you edit in the outliner.

and users can go online to obtain even more media from Microsoft's new Clip Gallery Live site.

Within PowerPoint, you can also expect more flexible animation: You'll be able to have objects move on-screen, even to apply predefined motions (such as swirls and zooms) to animate and introduce objects on the presentation screen.



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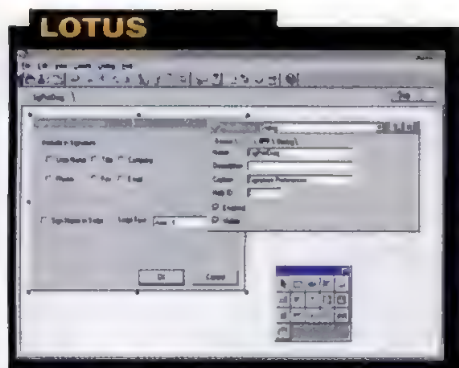
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The LotusScript IDE includes the Dialog Editor window, an ActiveX-compatible design environment you can use to build your own user interface dialogs. Tabbed pages let you switch quickly between all of your document's custom dialogs.

modify individual dialog properties using a property dialog. Also as in VBA, the Dialog Editor's version of the property dialog employs a tabbed interface in order to categorize the properties of all controls.

Since both Notes and Approach now support LotusScript, you can use either product quite easily as your data source. Lotus has created a LotusScript Extension Toolkit, available for free on its Web site, for developing DLLs that contain LotusScript classes. These files are developed in C++ and integrate smoothly into the LotusScript IDE, behaving just like standard LotusScript classes.

The external SmartSuite API, called *LotusObjects*, exposes a consistent set of object models for the core applications, which you can access externally or from other SmartSuite applications.

The LotusScript IDE comprises the Script Editor and Dialog Editor windows. The Script Editor is analogous to VBA's Code Window, but it takes a slightly different approach to providing instant access to key information. The top pane of the window is where you write your LotusScript code; like Microsoft's VBA, it provides drop-down list boxes for selecting objects and event scripts. The Script Editor's object drop-down list also maintains the hierarchy of the objects that you've created (a function performed by Microsoft's Project Explorer in VBA). The bottom pane of the window includes tabs that allow you to switch between an object browser, a breakpoint list, an output window, and a variables panel, which allows you to monitor variable values.

The Dialog Editor employs a similar approach to put all of your custom dialog windows just a mouse click away. This form painter includes a tab for each of your custom dialogs in the current document, making it easy to work on several custom forms at once. The Dialog Editor supports ActiveX controls and features a customizable toolbox. As in VBA, you

MICROSOFT OFFICE PROFESSIONAL 97

With the release of Office Professional 97, Microsoft presents the most complete programmability of any suite to date. This version of Office uses Visual Basic for Applications 5.0 in all of the key applications: Access, Excel, PowerPoint, and Word.

The language of the suite-based VBA 5.0 is identical to that included in the next version of

switch quickly between your document and your code. The IDE itself employs a multiple document interface (MDI) style that builds upon the traditional VB interface; any VB coder will feel right at home in VBA. The IDE also includes the Project Explorer, a window that displays a tree of your project's objects in order to help you organize your code and custom forms. The entire project, including code modules and forms, is saved within your own document file.

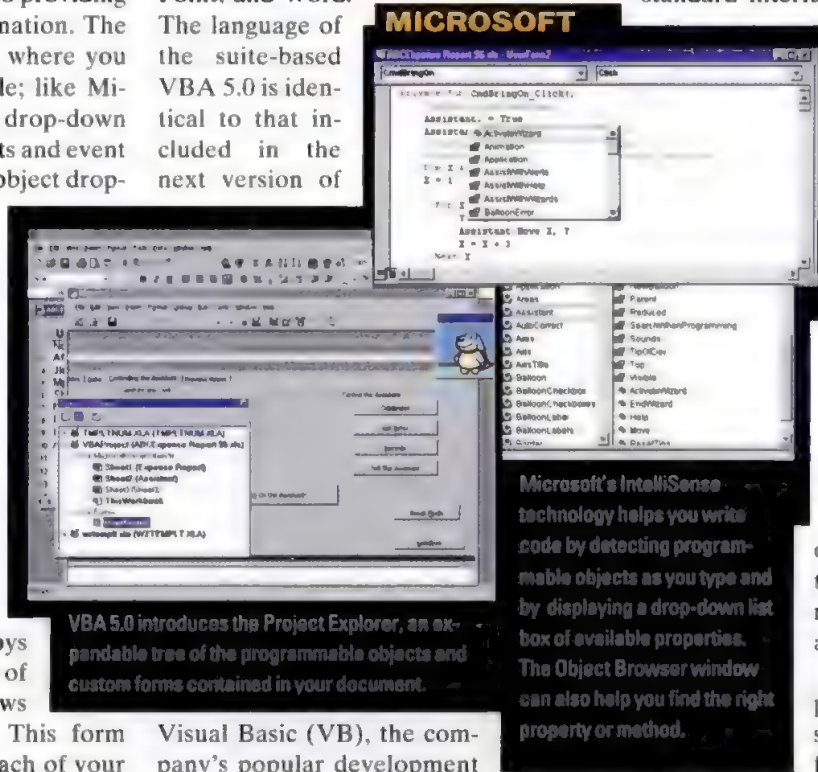
Another useful feature of VBA 5.0 is Object Browser, a window that allows you to traverse the Office object model. It helps you to locate just the right property or method. Other key elements in the IDE are the Properties, Locals, Immediate, Watches, and Call Stack windows. Together, they allow you to query variables and to test and debug your code manually. For creating custom dialogs, there's the new Microsoft Forms, a flexible form painter that's well integrated with the IDE's code-handling elements. It allows you to create forms with standard interface elements such as

text boxes, radio buttons, scroll bars, or any ActiveX control.

The Microsoft Office Professional Object Model is quite complete and consistent. No matter which of the applications you're using at the moment, you can have access to virtually all of the package's functionality. You can control all of the application interfaces, including the new Office Assistant and the VBA IDE.

Microsoft is also planning to release a special version of Office Professional 97,

which will be geared toward developers who wish to build and distribute their own Microsoft Office solutions; the product should be available shortly after you read this. □



VBA 5.0 introduces the Project Explorer, an expandable tree of the programmable objects and custom forms contained in your document.

Microsoft's IntelliSense technology helps you write code by detecting programmable objects as you type and by displaying a drop-down list box of available properties. The Object Browser window can also help you find the right property or method.

Visual Basic (VB), the company's popular development product.

All of the Office applications except Access provide the VBA IDE, through the Alt+F11 keyboard combination. It opens in a separate window, so you can

EIZO NANAO WINS AGAIN!

Back To Back Nod For Monitor Maker

By Rex O. Looshun
MONITOR STAFF WRITER

LOS ANGELES — It's an announcement that is becoming all too familiar. EIZO Nanao Technologies has once again taken home the coveted Editor's Choice Award from PC Magazine.

This sixth award in the past six years goes to the company's FlexScan® TX-C7S 17-inch class color monitor. It's an honor that carries particular significance as it cites superiority in the judging category having the toughest standards.

"The TX-C7S monitor's image was especially sharp and clear, with no detachable faults," said a PC Magazine judge.

Not too surprising for EIZO, though. The company's monitors previously earned Editor's Choice



October 8, 1996
FlexScan TX-C7S

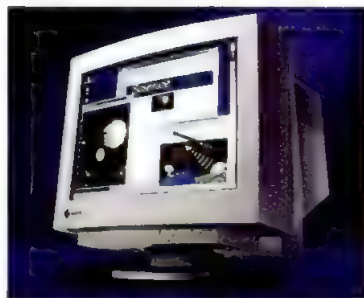
accolades in 1990, 1992, 1993—
for its FlexScan 9400, F550iW
and FlexScan F340iW monitors—
and last year for its highly regard-
ed FlexScan T2-17TS model.

TX-C7S Lauded as 'Best of the Best'

By E.Z. Vivwin
MONITOR STAFF WRITER

LOS ANGELES—Words such as "unbeatable," and "top flight," have been flying around town ever since EIZO Nanao's FlexScan TX-C7S 17-inch class color monitor walked off with the 1996 PC Magazine Editor's Choice Award.

With this key award under its belt, the FlexScan TX-C7S figures to be the monitor of choice for graphics and business professionals who demand crisp, true-to-life colors and stable screen images



This year's big winner: The FlexScan TX-C7S
17-inch class color monitor.

for desktop publishing, 24-bit
imagery, high-end graphics and
multimedia applications.

Editor's Choice: The Award That Shapes Industry Thinking



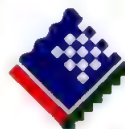
It's deja vu all over again: EIZO Nanao has now
won six Editor's Choice Awards in six years.

By Mona Turr
MONITOR STAFF WRITER

LOS ANGELES—Winning a PC Magazine Editor's Choice Award tells the world of hungry hardware buyers that you've arrived in a big way.

"It's the one award we all dream about, the one we covet more than any other," said N.V.S. Guy of Silicon Valley's LuzerCom.

EIZO Nanao monitors have earned worldwide recognition for dependability, cost-effective performance and pleasing, ergonomic design. In fact, I'm going to stop writing this story right now so I can call EIZO Nanao Technologies at 1-800-800-5202. Then again, I could get an informational fax on demand by calling 1-800-416-FLEX. Either way, like the TX-C7S, I'm a winner.



PRODUCED BY NANAO

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The Net Grows Wider

INTERNET SERVICES

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The Internet is coming to a PC near you. New services are springing up everywhere, but which offers the best way to get to the Net? *By Todd Spangler*

If you don't already have Internet access, rest assured—you will. By the year 2000, according to the online research firm Jupiter Communications, 36 million U.S. households will be connected to the Inter-

net, up from 9.6 million in 1995. New companies and products are emerging daily, promising to link you to the growing number of people and places on the Internet at lightning-fast speeds, through your

INTERNET SERVICES

How to Read the Suitability to Task Boxes

Setup and orientation We expect the service provider to automate as much of the installation process as possible. We want to connect to the service quickly and easily, without having to configure TCP/IP settings. We consider whether the service provides any tutorials or guides on using Internet services. We rate any forums, newsgroups, and FAQs concerned with using the service or navigating the Internet.

Software We evaluate the software bundled by the service. If the service requires you to use its proprietary software exclusively, we give it lower marks—we expect to be able to use the latest Web browser.

We rate the individual components: browser, e-mail, news reader, HTML editing tools, and any other software provided. We also consider whether the service lets you connect using other dialer software, such as Windows 95 Dial-Up Networking.

E-mail and Internet services We look at how many e-mail accounts the service includes, and whether you can specify your own e-mail address. We want the ability to read and compose e-mail off-line and

SUITABILITY TO TASK	
Service	
Setup and orientation	Excellent
Software	Good
E-mail and Internet services	Fair
Technical support	Poor

send attachments over the Internet. We also expect the service to host its own newsgroup and Internet Relay Chat servers. If the service hosts Web pages, we consider what tools and support for designing and

uploading pages the service offers.

Technical support We rate the quality of the online support provided through newsgroups, forums, or chat areas. We also consider telephone technical support hours, and whether support is provided toll-free at a dedicated number.

PC, your TV, your phone, or some other device, such as the much-discussed—and often dismissed—network computer.

Today, though, most of us will have to get to the Net the old-fashioned way: using a PC and an analog modem. And most of us will purchase Internet time from one of two types of services: an online service or an Internet service provider (ISP). For information on connecting business users, see “Link Your Network to the Net” in this issue.

Online services include America Online, CompuServe Information Service, The Microsoft Network (MSN), Prodigy, and the recently launched WOW! from CompuServe. These online services are still the largest providers of dial-up Internet service, and they’re making it easier for you to sign up. They’re also merging with the Internet: Prodigy and MSN plan to eliminate their proprietary interfaces altogether and move entirely to Web-based content. CompuServe will also begin to convert its

content to HTML beginning this fall.

ISPs are concerned with providing you Internet access, plain and simple. Unlike the online services, ISPs don’t bother delivering much content beyond what they put on their Web sites. Also, an Internet service provider assumes you know what you’re doing. Experiencing the Internet through an online service can be like a tour of Europe with a paid tour guide on an air-conditioned bus; going with an ISP is more like getting a Eurail Pass, thumbing through a Berlitz phrase book, and sacking out in youth hostels.

But ISPs are changing, too, as Internet access is transformed into a consumer commodity. The Big Three telecommunications companies are elbowing in: AT&T launched its WorldNet Service this year; MCI repackaged its Internet service with MCI One, which includes multiple communications services bundled together; and Sprint will roll out its consumer Internet offering later this year. Local phone companies like GTE are also entering the ISP business, and cable companies may follow once they decide how to deliver access. Like telephone service, Internet access is fast becoming an ordinary utility.

How fast can you connect? For the near future, most consumers will be using 28.8-Kbps modems at best (see the sidebar “Your Internet Mileage May Vary”). ISDN service—which provides 128-Kbps throughput—is an option in some areas, but it’s still not as widespread as plain old telephone service. See the sidebar “After Analog: Faster Connections” for information on ISDN, satellite, DSL, and cable-modem technologies.

MORE WEB FOR LESS BUCKS

The cost of Internet access will vary. Access via an ISP will end up being less expensive than access through an online service, especially if you plan to spend a lot of time online. The difference becomes apparent if you’re online more than 5 hours a month. For \$9.95 per month, AOL, CompuServe, and Prodigy will give you 5 hours of access time; after that, it’s \$2.95 per hour. The ISPs provide more varied usage plans, including the popular “all you can eat” type of pricing: unlimited access for a flat fee. Every ISP worth its salt provides unlimited access for \$19.95 per month. By the time you read this, MSN will have changed its pricing to include a \$19.95-per-month plan.



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REVIEW CRITERIA

In this roundup, we compare 17 services that provide Internet access. To be included for review, the service had to provide single-user accounts with at least 200 points of presence (POPs) nationwide, and have at least 100,000 current sub-

scribers. Besides the major online services, our filter netted 12 Internet-only services: AT&T WorldNet Service, Concentric Network, EarthLink Network, Global Network Navigator, GTE Internet Solutions, IBM Internet Connection Service, IDT Internet Services, MCI Internet, MindSpring, Netcom, SpryNet, and Whole Earth Networks.

Several companies did not meet our filter or were otherwise excluded. Sprint Internet Passport was available only to Sprint long-distance customers at the time of our review. PSINet—one of our Editors' Choices last year in our review of Internet services ("New Paths to the Net," October 10, 1995)—sold its consumer accounts to MindSpring and will sell its Internet service to businesses and through other ISPs. Likewise, UUNet Technologies, whose dial-up service we reviewed last year, has become largely a backbone provider that resells its services to other ISPs. (See the article "Link Your Network to the Net" in this issue for information on choosing an ISP for your business.)

The large ISPs are the most visible, but under the radar are more than 3,000 local ISPs that can provide excellent and less expensive Internet service. Many consumers and businesses access the Internet through these small but cost-effective operations. Check *PC Magazine's* Internet-User site at www.internetuser.com/isp for information and links to sites that list thousands of local ISPs nationwide.

BROWSER FIGHT!

Each of the services we reviewed provides some sort of Internet software, and the row between Microsoft and Netscape has filtered into the online arena. By the time you read this, America Online will offer Microsoft Internet Explorer 3.0 (IE 3.0) as its standard browser; CompuServe will provide IE 3.0 but will let you choose Netscape Navigator if you want. Many of the ISPs we review include Netscape Navigator as an all-in-one Web, e-mail, and newsgroup client.

In truth, though, your ISP will let you use any browser or other TCP/IP software, though some services provide only 16-bit TCP/IP stacks. There are two exceptions: Neither Prodigy nor WOW! lets you use any third-party software—you must use the software they provide. Although their software is fine and function-

Editors' Choice

- Online service: America Online
- Internet service provider: SpryNet



Whatever your level of Net knowledge, your provider should be able to deliver the pricing, service, software, and support you're looking for.

For Internet access, America Online is our Editors' Choice of the online services for the second year in a row. If you want to step into the Internet pool—but also retain the comfort and content of an online service—AOL is a good choice. The service's excellent software is easy to set up and use, and AOL provides users with a fine introduction to Internet tools and topics. AOL's technical support is very good, both online and over the phone.

AOL's only drawback is that over a dial-up connection the service currently supports only 16-bit Winsock applications; later this year AOL is planning to release a 32-bit version of its software that will be able to run 32-bit applications.

Of the other online services we reviewed, CompuServe also provides good Internet access, and its new interface should enhance its solid core of services. MSN, tightly integrated with Windows 95, will launch a revamped

HTML-based service this fall with an unlimited-access pricing plan.

Of the Internet-only services we reviewed, each provides adequate service at similar rates. One that stood out for its overall ease of use, software, and service was SpryNet. SpryNet includes a good software package; members can also download free software such as Cyber Patrol for blocking access to specific Web sites. Its tutorials for beginners are helpful and come with shareware you can download and try, and the service includes easy-to-use tools with which to create your own Web page along with 5MB of server space in which to store it.

SpryNet's technical support online is available 24 hours, 7 days a week; however, the service does not offer toll-free phone support. Users who require this should consider an online service such as AOL or CompuServe instead, or sign up with an ISP that provides around-the-clock phone support, such as AT&T or IBM.

al, you will miss out on new Web technologies like ActiveX and JavaScript.

Starting later this year, updates of Windows 95 will include setup software for America Online, AT&T WorldNet Service, CompuServe, and WOW! along with the MSN setup icon, which will continue to appear on the desktop.

GET THE SERVICES YOU WANT

Though it may seem that ISPs provide solely a pipeline to the Internet, they do include value-added features. All the services we reviewed provide e-mail, still the most popular Internet application. E-mail services vary, however: Some let you choose your own e-mail address; others assign you a meaningless garble of letters

or numbers. If you have household members who want separate addresses, several services—including America Online, Prodigy, and WOW!—let you set up multiple mailboxes.

A personal Web page is the vanity plate of the nineties. Many services will provide tools to help you create your own page and will host at least 1MB of your own content on their Web servers. You'll also want to look at the technical support the services provide. The online services generally provide more responsive support than do most ISPs. Again, you'll pay a little bit more for an online service if you spend more than a few hours online each month, but it may be worth the extra expense to hire a tour guide.

HIGHLIGHTS

Internet Services



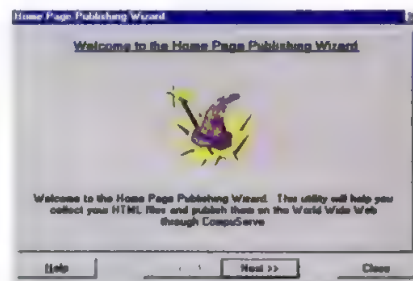
◀ **Microsoft vs. Netscape** The Web browser wars have hit the online services and ISPs. Most services provide either Microsoft Internet Explorer or Netscape Navigator, but usually you can substitute any software you choose.

▶ **Web-based content** Online services are merging into the Internet. CompuServe, MSN, and Prodigy all plan to deliver their services entirely on Web pages in the future.

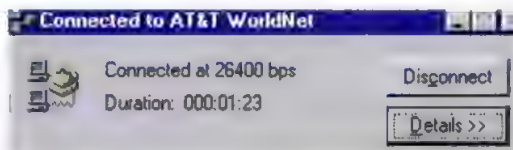


◀ **Flat-rate pricing** Most ISPs offer unlimited access for \$19.95 per month. While America Online, CompuServe, and Prodigy don't offer unlimited-access options, WOW! currently does, and soon The Microsoft Network will do the same.

◀ **Internet 101** Online services such as AOL still make it easier for new users to get started on the Internet than many ISPs do.



▶ **Windows 95 integration** Several Internet service providers use Windows 95's built-in TCP/IP stack and Dial-Up Networking client for easier setup.



▶ **Web-page hosting** Online services do a better job of providing tools and assistance to help you create your own Web presence. ISPs generally give you more storage space on their servers.



Online Services

America Online Inc.

America Online



America Online allows even the most inexperienced users to connect quickly, easily, and at competitive rates. For almost two years, AOL has equipped users with a full suite of proprietary access tools, but the latest incarnation of its software, Version 3.0, goes a step further and automatically sets up its own Winsock for use with any 16-bit Internet software. Sometime this fall, AOL will enter the browser race by offering Microsoft Internet Explorer 3.0 as the service's standard Web browser.

Version 3.0 is 16-bit software for Windows 3.x or Windows 95 that can be obtained via the keyword *upgrade* if you are using a previous version of AOL, by calling the company, or by downloading it from www.aol.com. The software installs itself and connects to the America Online network in less than 15 minutes. Con-

necting to this highly graphical, interactive online service and its Internet features costs \$9.95 per month for 5 hours, and \$2.95 for each additional hour (an alternative plan provides 20 hours for \$19.95). AOL keeps careful track of the time you spend online, and your total bill is available at the keyword *billing*. Like CompuServe and Prodigy, AOL currently doesn't offer a flat-rate plan for unlimited access.

AOL lets you have five different users per account, for which you can select



America Online's Internet Connection screen has links to AOL's Internet tools and third-party software.

names and passwords. You can also compose e-mail off-line, but unless you've downloaded mail using a *Flash Session* (a feature that automatically sends and receives your mail), you can't read mail off-line. AOL—unlike CompuServe, Prodigy, or WOW!—lets you send binary file attachments over the Internet.

For first-time users, a "Welcome to the Internet!" window offers access to FTP, Gopher, Usenet newsgroups, and the Web, as well as search engines, lists of popular sites, and a link to software for Global Network Navigator (AOL's Internet-only service, also reviewed in this roundup). Although most of its access tools are ready to run, AOL does not include a browser on the disk; when you initially select the Web access icon, the client auto-

SUITABILITY TO TASK

America Online

Setup and orientation	Excellent
Software	Excellent
E-mail and Internet services	Good
Technical support	Excellent



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— PC Magazine, June 1996

SUITABILITY TO TASK

CompuServe Information Service

Setup and orientation	Good
Software	Good
E-mail and Internet services	Good
Technical support	Good

matically downloads the latest version of the AOL browser, installs it, launches it, and loads the company's home page. AOL's site provides extensive tutorials and help sites that guide beginners through the wilds of the Web.

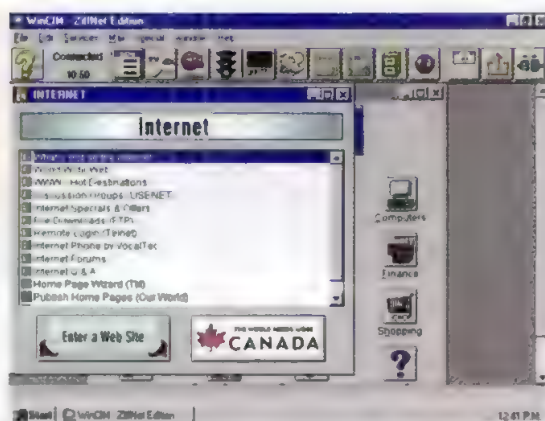
If you're already well acquainted with the Internet, you'll want to bypass the Internet welcome window in favor of the Internet Connection interface. This offers a menu for each AOL access tool, but also allows you to download a vast number of third-party tools easily, including Netscape Navigator. AOL's Winsock is compatible with all 16-bit TCP/IP software but does not support 32-bit applications, so you'll have to use Windows 3.x versions. Later this year AOL will release a Windows 95 version of its software that will run 32-bit Winsock-compatible software. America Online allows you to create your own Web presence, allowing up to 2MB per screen name (10MB total per account). The Personal Publisher tool, integrated with the AOL client, lets novices develop and upload a home page easily and quickly.—Cade Metz

America Online. America Online Inc., Vienna, VA; 800-827-6364; www.aol.com. Circle 441 on reader service card.

CompuServe Inc.

CompuServe Information Service

That old stalwart of online services, CompuServe Information Service, has long offered a solid set of Internet access tools in addition to excellent content. The biggest drawback of CompuServe is its inflexible 16-bit WinCIM 2.0.1 software. CompuServe 3.0, a successor to WinCIM that promises a greatly enhanced interface integrated with Microsoft Internet Explorer 3.0, was in beta testing at the time of this review and will be available by the time you read this.



CompuServe's Internet access menu, while not as graphical as AOL's, loads you to all the service's Internet functions.

CompuServe's basic pricing is similar to AOL's and Prodigy's: \$9.95 per month for 5 hours, plus \$2.95 for each additional hour; or \$24.95 per month for 20 hours, plus \$1.95 for each additional hour. Like AOL and Prodigy, CompuServe has no flat-rate option for unlimited access. CompuServe does, however, offer the Internet-only SpryNet service, reviewed in this roundup, which has such a plan.

Setting up CompuServe is extremely smooth, except for one confusing question: You're asked whether you want to install CompuServe's 16-bit Winsock, or use a Winsock already installed on your system. Windows 95 users will want to use the 32-bit Winsock included with the operating system. CompuServe assigns your account a numeric e-mail address such as 72241.0000@compuserve.com, though you will soon be able to choose a character-based e-mail address. Unlike AOL, Prodigy, or WOW!, CompuServe allows just one user name per account.

Once you're on the service, the main menu points you in the direction of news, entertainment, and other subject sections. CompuServe's online service continues to excel in the depth and variety of its content and forums. You can reach CompuServe's Internet resources through the main menu, or you can launch the included browser, Spry Mosaic 4.0, from the WinCIM toolbar. You can also access the Internet by connecting to the service with either the CompuServe dialer or Windows 95 Dial-Up Networking, and then

launching your Web browser of choice.

CompuServe has several helpful Internet forums where you can ask questions about the Internet. You can download a free copy of Cyber Patrol, a program that lets you block Internet access, and parental controls are available for areas within the service. There are few links from within the service to Internet sites; CompuServe's Web site provides a better collection of subject links and search engines.

CompuServe's included FTP, telnet, and Usenet newsgroup clients are basic but functional. The integrated newsreader's best feature is its ability to mark messages for downloading. As with Prodigy and WOW!, you can't send binary attachments with CompuServe's Internet e-mail client, though you can send attachments to other CompuServe users.

Creating personal Web pages is extremely easy. You can make the most of your 1MB of space by using CompuServe's free Home Page Wizard, which walks you through the process of creating a home page, and its Home Page Publishing Wizard, which helps you upload your site to the server.—Melissa J. Perenson

CompuServe Information Service. CompuServe Inc., Columbus, OH; 800-524-3388; www.compuserve.com. Circle 442 on reader service card.

Microsoft Corp.

The Microsoft Network

If you're running Windows 95, you're probably already familiar with The Microsoft Network (MSN) because its icon sits on your desktop. Around the time you read this, however, MSN will no longer be the same graphically rich, glacially slow service; rather, the new MSN will consist of Internet access and entirely Web-based content. MSN offers fine dial-up service and convenient setup, but it doesn't give you any Internet software beyond the company's Internet Explorer browser.

MSN will also revamp its pricing, offering an unlimited-access plan for \$19.95 per month, which matches what most ISPs charge. The standard plan will cost \$6.95 per month for 5 hours of free access, plus \$2.50 for each additional hour of use.

SUITABILITY TO TASK

The Microsoft Network

Setup and orientation	Good
Software	Good
E-mail and Internet services	Good
Technical support	Good

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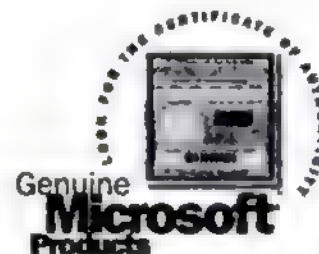
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After Analog: Faster Connections

By Les Freed

Most Web surfers rely on modems to connect to the Internet. But if you've spent time online, you know that modems take up to a minute to connect, they're subject to phone line interference, and they often disconnect with no warning. Most of all, they're slow. Sure, 28.8 Kbps seemed fast once, but Web pages now include lots of graphics, sound, and even video—and that old 28.8 modem just won't cut it any more.

The last modem technology upgrade moved the throughput ceiling from 28.8 Kbps up to 33.6 Kbps. Though some vendors are now talking about 56-Kbps modems, there's only so much tweaking that can be done to squeeze more data through today's telephone network. The end of the modem road comes at a time when millions of people use the Internet. But the cry for more bandwidth has been heard and in some cases even anticipated: Four new digital technologies promise to break the bandwidth logjam: ISDN, satellite, cable modems, and DSL.

TODAY: ISDN AND SATELLITE

So what's real *now*, and real fast? ISDN—despite all its bad press—is an increasingly good value. Several of the services in our roundup—including CompuServe, EarthLink Network, GTE, MindSpring, MSN, and Netcom—offer ISDN access in certain areas. Although nationwide rates vary widely, ISDN often costs less than two analog phone lines do. A single ISDN line provides two channels, each with 64 Kbps of data or voice capacity. If you need more bandwidth, you can combine the two channels to get a 128-Kbps

connection to your ISP.

To use ISDN on your PC you need a device called a *terminal adapter*, or TA, which can be either an external unit connected via a serial cable or an internal ISA- or PCI-based card. Most ISDN TAs provide one or two RJ-11 analog jacks for a phone, fax machine, or analog modem, allowing you to use phone equipment on the ISDN line. You can buy good TAs for about

\$400. Motorola's BitSurfr Pro and U.S. Robotics' Sportster ISDN 128K each received an Editors' Choice in our comparison of ISDN TAs (see "Fast Connections," June 11, 1996).

If 128 Kbps doesn't cut it, you might want to look at the DirecPC from Hughes Network Systems (800-347-3272; www.direcpc.com), a division of Hughes Electronics Corp. (Hughes provides TV programming over its direct satellite system through another subsidiary, DirecTV.) DirecPC uses a 24-inch dish to provide a 400-Kbps downlink from the Internet. Hughes charges a reasonable \$16 to \$40 per month, based on the amount of data you transfer.

Because the small dish can't transmit, you talk back to the Internet via a modem connection. This is ideal for Web browsing, but not so great if you routinely send large

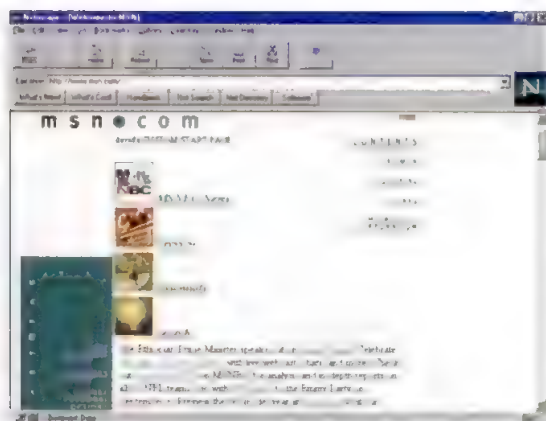
e-mail files, since they'll have to take the slow road via the modem.

TOMORROW: CABLE OR DSL?

Off in the future, cable modem and digital subscriber line (DSL) technologies promise to deliver data at Ethernet speed—10 Mbps—using ordinary TV cable or existing twisted-pair copper phone lines. But these two technologies have almost no chance of being deployed on any large scale within the next five years because of the difficulties service providers encounter in marketing and selling new communications systems like these.

Cable modems have grabbed most of the attention lately. The specifics vary from one vendor to another, but the basic premise is this: You buy a box from the cable company. You plug your TV, PC, and maybe even your phone into the box. The box delivers cable service to your TV, a dial tone to your phone, and 6 Mbps to 30 Mbps of data bandwidth to your PC. Early results from cable modem trials are encouraging. But these trials are carefully organized to avoid bottlenecks, and trial users receive a level of installation and operation support that isn't economically feasible on a large scale.

DSL is being promoted by several regional phone companies as the logical successor to ISDN. DSL provides 1.6 Mbps to 6 Mbps of data bandwidth over existing phone lines. Like cable modems, DSL sounds good, and it will be—some day. Many local telephone companies are just beginning to see a return on their investment in ISDN and are reluctant to embrace a new technology when they still haven't figured out how to sell the old one.



MSN lets anyone—nonsubscribers and MSN users alike—set up a custom start page with daily news and links.

The basic setup software will be available on a separate CD-ROM, or from the Web if you're already connected. Updated releases of Windows 95 will still have the MSN icon on the desktop. The software will include graphics, in an effort to preserve the rich look of MSN while decreasing the time required for pages to load. With MSN, you don't have to worry about configuring a Winsock or a dialer. Because of the software's strong integration with Windows 95, these problematic setup issues are virtually invisible. You can access MSN solely as an ISP and use any browser, including Netscape Navigator. However, to access much of MSN's exclusive content, you will need to use Microsoft Internet Explorer because the service will sprinkle ActiveX controls liberally through its pages. Microsoft Internet Explorer is currently the only browser that supports ActiveX.

The Microsoft Exchange inbox will still be the e-mail client for MSN members, which means you'll be able to create folders and an address book easily. However, you cannot change your e-mail address without starting a new account. Exchange currently lacks the ability to check for new mail periodically—it checks only when a user first logs on—but the new MSN will notify you of new mail without you having to open Exchange. You can read and write e-mail off-line, though, and you'll continue to be able to do so.

The content offered currently on www.msn.com will still exist for free, but value-added services will be available exclusively for MSN members, including a

free subscription to Slate and other premiums similar to those now available to Internet Explorer users. Chat services will still exist on the Web-based MSN, including the added ability to search for friends in chat rooms. Useful features of the old MSN—such as links from news and features to Web sites—will also migrate to the Web-based MSN service. With what looks to be an appealing array of content and a new unlimited-access pricing plan, MSN will definitely be worth exploring.—*David Lidsky*

The Microsoft Network. Microsoft Corp., Redmond, WA; 800-386-5550; www.msn.com. Circle 443 on reader service card.

Prodigy Inc.

Prodigy

For some time, Prodigy has lagged behind its competitors in depth of features, design, and content, as well as in providing 28.8-Kbps access points. Unfortunately, the company's current service doesn't break that streak. Prodigy, Version 1.5, offers its service along with basic Internet access for the same price you'd pay for AOL or CompuServe. But like WOW!, the service does not allow you to use third-party TCP/IP applications. Prodigy's increasing use of Web-based content—the most visually exciting ele-

SUITABILITY TO TASK	
Prodigy	
Setup and orientation	Excellent
Software	Fair
E-mail and Internet services	Good
Technical support	Excellent

Member Help link on the main screen, where users can ask questions of other users and customer support representatives day or night.

Navigating the service is a breeze. All the content is accessible via the GoTo menu bar option or by scrolling through a list of content offerings. The proprietary interface lacks the polished look of AOL and MSN, but its Web-based content, chock-full of inviting graphics and up-to-date design, makes the grade.

But Prodigy doesn't let you use third-party Internet software; users are limited to the service's proprietary browser. It supports many of the features Web users have come to expect—frames, tables, and client-side image maps—but lacks support for Java applets. Users will also have to do without IRC or telnet. FTP and Gopher sites can be accessed through the browser, and Prodigy hosts its own Usenet server, providing access to thousands of Usenet



Prodigy's Web-based content is more visually exciting than its traditional interface.

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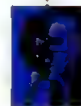
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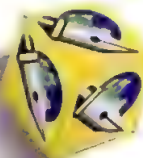
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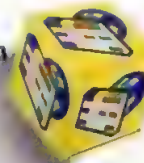
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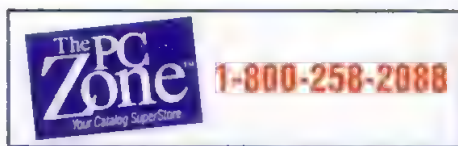
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Your Internet Mileage May Vary

By Frank J. Derfler, Jr.

At PC Magazine we anchor our product reviews on labs-based testing, but we realize that there is plenty of room for pragmatic hands-on experience as well. So to test Internet service providers, we dialed and dialed. From our labs at the northern end of Silicon Valley, we dialed 19 ISP access numbers a minimum of 25 times each to see what kinds of connections we made. From our Manhattan offices, we made a similar number of calls to 10 ISP access numbers. We called at various times during midday, evening, and weekend hours.

We make no claims that this testing is scientific; we're the first to admit that the results might have been skewed by subpar telephone wiring or other factors. Since the results of

these connection attempts varied according to a definite pattern, however, we feel they're worth reporting. Here are the conclusions we drew:

- It's worth buying a modem capable of connecting at 28.8 Kbps or faster. For our testing we used U.S. Robotics Courier V. Everything and Hayes Accura 28.8 modems. While we occasionally established a 28.8-Kbps connection, most connections with either modem were made at 24 or 26.4 Kbps. Don't limit yourself to 14.4 Kbps by using a slow modem, but don't expect 28.8 Kbps on most calls. Some PC vendors still ship systems configured with 14.4-Kbps modems, but don't scrimp—you'll want the fastest connection possible, especially if you're paying for Internet access by the hour.
- Several ISPs simply resell the

access services of other providers. GTE Internet Solutions, The Microsoft Network, and EarthLink Network all used the same phone numbers, which turned out to connect us to UUNet Technologies' access service. After the connection, these ISPs probably route you to their own e-mail and other services, but if making the initial connection is a problem, then switching among these carriers won't help.

- The ISPs are busiest on weekdays, particularly on Monday mornings. We received the largest number of busy signals on both coasts at those times. We can report that in California we experienced only a few busy signals or bad connections, but in Manhattan, Netcom and the multi-partnered UUNet access points were frequently busy.

news discussions. Prodigy also gives users 1MB of storage space for personal Web pages, as well as simple tools for creating, managing, and uploading pages.

As with AOL, Prodigy lets you have up to five separate e-mail accounts. Prodigy assigns you an alphanumeric e-mail address; you can also use a character-based e-mail address of your choice. The e-mail client features an address book and the ability to compose and read mail off-line; however, your messages are limited in size to 28K, and as with CompuServe and WOW!, you can't send file attachments over the Internet.—Angela Hickman

Prodigy. Prodigy Inc., White Plains, NY; 800-776-3449; www.prodigy.com. Circle 444 on reader service card.

CompuServe Inc.

WOW! from CompuServe

Though it may suffice for novices, WOW! from CompuServe is not the service to choose if you're looking for powerful Internet access. WOW! (\$17.95 per month for unlimited usage;

first month free) and Prodigy were the only services we saw that require you to use the included browsers to access the Internet and don't let you use other TCP/IP software.

Because you're forced to use WOW!'s simplified browser—a customized version of Microsoft Internet Explorer 2.0—you can't explore the latest Web technologies, such as ActiveX, frames, Java

applets, and other plug-ins. Furthermore, the browser lacks a URL locator bar, which forces you to right-click on a Web page and view the page's properties to check the URL. Also, WOW! can access only FTP sites and Usenet newsgroups via the Web browser, and (like CompuServe and Prodigy) does not let you send binary file attachments across the Internet. For users who want a simple taste of the Internet, though, WOW! is just fine.

With a bright, easily navigable interface and six user names per account, WOW! will appeal to Internet newcomers and families. Setup is very easy, with clear directions and no room for ambiguity. If you need help, you can access WOW!'s toll-free phone



The WOW! interface is cheery, but you're stuck with it: You can't use third-party software with the service.

SUITABILITY TO TASK

WOW! from CompuServe

Setup and orientation	Good
Software	Fair
E-mail and Internet services	Fair
Technical support	Excellent

The Vision

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EDITORS' CHOICE



August 1996
Austin Edge CD 133



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32-Bit PCI Windows Video Accelerator – 1MB
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28.8 Fax/Modem w/ Speakerphone
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Integrated Glide Point® Mouse
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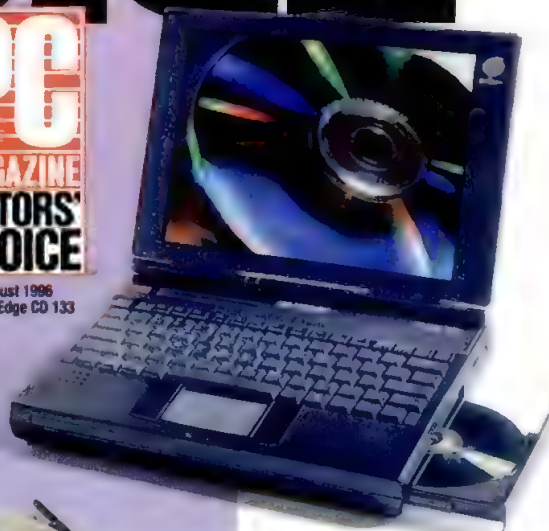
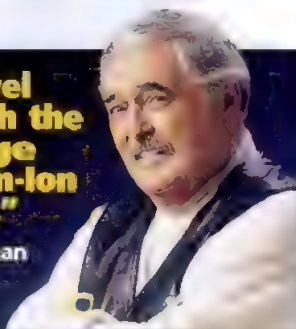
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11.3" TFT 800 x 600 Color Display
32-Bit PCI Windows Accelerator – 2MB
6X CD-ROM Drive
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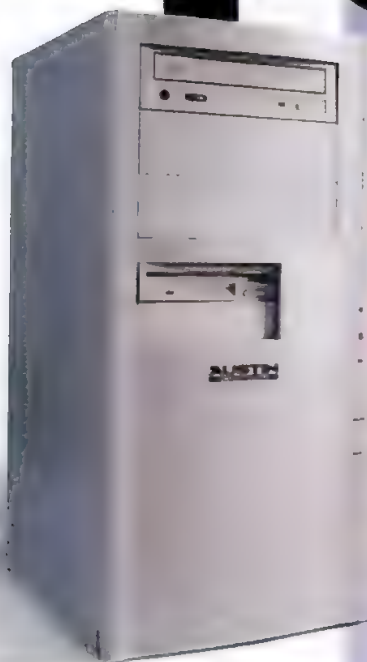
Business Lease: \$132 / month

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support 24 hours a day, 7 days a week. WOW! lets you choose your own e-mail addresses for each user, instead of assigning a numeric address as CompuServe does. Users sharing an account retain separate passwords, bookmarks, preferences, and address books.

One unique aspect of WOW! is that it offers separate interfaces—or “views”—for kids and teens. Both special views offer tailored access to content and features appropriate to the age group targeted. For example, the kids’ view does not allow access to WOW!’s shopping areas or its chat function. Also, when establishing the child’s account, parents can opt to screen a child’s mail.

Since the service’s debut in March, WOW! has done a good job of building up its content base. But there are still troublesome gaps in the service’s Internet access. Behind WOW!’s glossy facade is Microsoft Internet Explorer 2.0. That means that WOW!’s integration with the Internet is a little *too* complete—sometimes you can be freely surfing the Web and not realize you’ve left WOW!’s friendly confines.—*MJP*

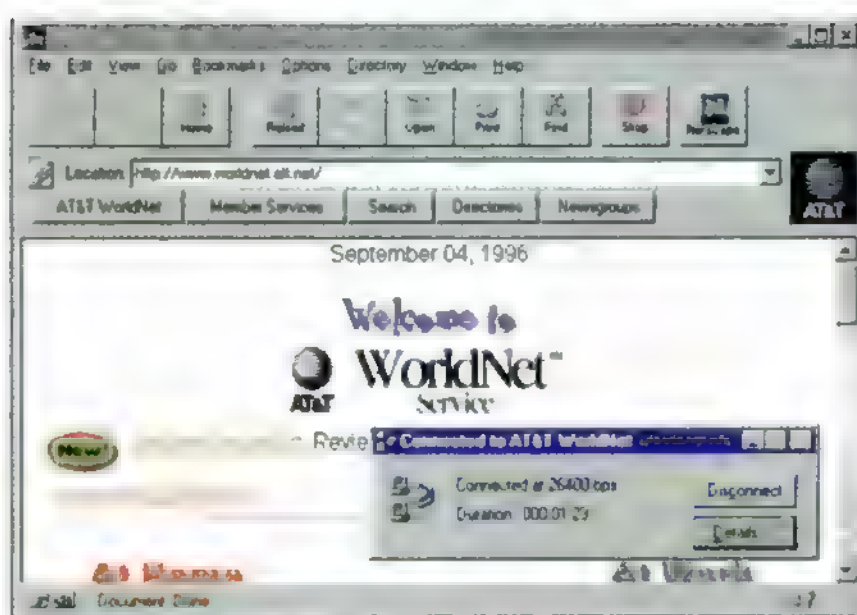
WOW! from CompuServe. CompuServe Inc., Columbus, OH; 800-943-8969; www.wow.com. *Circle 442 on reader service card.*



AT&T WorldNet Service

Earlier this year AT&T blazed into the Internet service business, using its brand name and customer base to sell the Internet to everyone and his grandmother. It did a good job, too: AT&T WorldNet Service includes a customized 32-bit version of Netscape Navigator 2.01—which includes built-in e-mail and newsreader tools—that’s easy to install and set up. But like IBM and MCI, AT&T does not host subscribers’ Web pages.

AT&T long-distance customers get 5 hours of free service every month; the service is \$2.50 per hour thereafter. You can also get a flat rate of \$19.95 per month for unlimited use. If you’re not an AT&T customer, AT&T’s plans cost slightly more: \$4.95 per month for 3 hours



AT&T WorldNet uses the Windows 95 Dial-Up Networking client and a custom version of Netscape Navigator 2.01.

of access, plus \$2.50 for each additional hour; or you can pay \$24.95 per month for unlimited use.

Though novice users may consider setting up and configuring Internet access software daunting, AT&T makes it simple. Like many of the services we reviewed, AT&T WorldNet uses a setup wizard that prompts users for Windows 95’s Dial-Up Networking files from the Windows 95 CD, if they’re not already on the system. (For Windows 3.x users, AT&T provides a 16-bit version of Navigator, and a separate dialer and Winsock.) You then choose a local dial-up number and modem speed, and provide credit card information. AT&T offers minimal printed documentation but provides toll-free access to technical support along with myriad help files online.

AT&T’s customized Netscape Navigator 2.01 browser is the heart of the package. From the AT&T home page, users can access Web sites and guides categorized in subject areas such as computing, entertainment, news, and weather. The service also lets you use other browsers, such as Microsoft Internet Explorer, or any other TCP/IP software. With each WorldNet account, you receive just one e-mail address. You can send and receive e-mail through Netscape Navigator’s e-mail module, which supports folders and multiple attachments and includes a standard address book. In addition, you can access newsgroups on AT&T’s own Usenet newsgroup server through Navigator’s news reader.

Though AT&T World-

SUITABILITY TO TASK

AT&T WorldNet Service

Setup and orientation	Good
Software	Good
E-mail and Internet services	Fair
Technical support	Good

Net offers basic Internet services, it does not include more advanced features and software that some users will miss: Along with Web-page hosting, HTML editing tools are absent, as is Internet Relay Chat.—*AH*

AT&T WorldNet Service. AT&T Corp., Bridgewater, NJ; 800-967-5363; www.att.com/worldnet. *Circle 445 on reader service card.*

Concentric Network Corp.

Concentric Network

Concentric Network provides adequate Internet access at standard prices. Concentric includes only Netscape Navigator 3.0; like other ISPs, the service uses Navigator’s e-mail client and news reader by default. Concentric Starter Plan customers pay \$7.95 per month for 5 hours of service, and \$1.95 for each additional hour; the price of Concentric’s unlimited-access plan—\$19.95 per month—is in line with what most other ISPs charge.

Installation is fairly simple. A Netscape installation wizard takes you through various configuration decisions, and then automatically dials your local access number. Once connected, you’re presented with Concentric’s home page, which includes a searchable index of Concentric customer home pages as well as links to chats and other Internet access sites. A list of links to subject categories on the Excite! Web site is also on the home page.

At Concentric’s Web site, users can perform administrative functions such as changing their log-on passwords. Concentric lets you store up to 5MB of personal Web content on its servers, but doesn’t give

you much guidance with respect to creating or uploading pages aside from links to other tutorials and to free soft-

SUITABILITY TO TASK

Concentric Network

Setup and orientation	Fair
Software	Good
E-mail and Internet services	Fair
Technical support	Good

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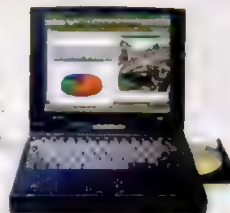
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Echos P100E

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ware. Concentric offers one e-mail mailbox per subscriber, and your e-mail address is assigned to you. If you want to change it, you must contact customer support.

Included with its Internet access, Concentric provides customers with free access to BBS Direct—a service that links more than a dozen popular bulletin-board systems across the U.S., including Concentric's own CRIS system. Not for beginners, BBS Direct requires you to access the BBSs via telnet or a terminal program. Documentation on connecting to these text-only services is scarce, and you'll either need to know what BBS files or discussions you're after or spend some time looking around.

Concentric provides its own news server offering more than 20,000 groups, accessible using Navigator's news reader. You can browse and search messages by date, and new messages can be created off-line. Users can download freeware Internet Relay Chat readers and access IRC channels through the service.

—Simon T. Eskow

Concentric Network. Concentric Network Corp., Cupertino, CA; 800-939-4262; www.concentric.net. **Circle 446 on reader service card.**

EarthLink Network Inc.

EarthLink Network

Experienced users will like the EarthLink Network, which provides quality service at \$19.95 per month for unlimited access and includes Netscape Navigator 2.0. For first-time Internet users, the EarthLink ExpressNet Suite (\$39.95) provides extensive, useful orientation before you even log on to the Net. ExpressNet Suite includes Netscape Navigator 2.0 and some of its more popular plug-ins; it's a good package for beginners but overkill for other users.

Once you successfully log on, EarthLink's information-packed home page provides site recommendations by category, downloadable free software, and online customer support. EarthLink's service includes 2MB of space reserved for your personal Web home page. EarthLink recommends specific HTML editing tools that can be downloaded from the site for free, and the service provides a thorough explanation of HTML for beginners. EarthLink provides one e-mail address to begin with; additional mailboxes cost

\$9.95 each to set up and \$4.95 per month to maintain.

The most impressive aspect of the EarthLink ExpressNet Suite is its very easy setup and thorough orientation to the Net. The program walks you through installing the basic software with audio assistance in addition to on-screen prompts. An included booklet called *Getting the Most out of EarthLink* is very helpful; so is a tutor that explains how to use Netscape Navigator and other Internet services like e-mail and FTP. In addition, EarthLink ExpressNet Suite includes a foldout "Internet road map" full of links to interesting sites.

EarthLink's customer support number, available 24 hours a day, 7 days a week, recommends that you e-mail questions to tech support—but we never received a reply to our e-mail query. After waiting about 20 minutes on the telephone, we were able to talk with a helpful and reasonably knowledgeable technical support person.

EarthLink provides good basic Internet service, if that's all you need. The ExpressNet Suite will be of value only to those who feel

SUITABILITY TO TASK

EarthLink Network

Setup and orientation	Excellent
Software	Good
E-mail and Internet services	Fair
Technical support	Fair

SUMMARY OF FEATURES

Internet Services



ONLINE SERVICES

INTERNET SERVICE

■ YES ■ NO
Services listed in alphabetical order by category

	America Online	CompuServe Information Service	The Microsoft Network	Prodigy	WOW! from CompuServe	AT&T WorldNet Service	Concentric Network
Web address	www.aol.com	www.compuserve.com	www.msn.com	www.prodigy.com	www.wow.com	www.att.com/worldnet	www.concentric.net
Number of U.S. points of presence	550	410	287	322	410	215	220
Setup fee	None	None	None	None	None	None	None
Monthly fee for basic access	\$9.95	\$9.95	\$8.95	\$9.95	\$17.95	\$4.95	\$7.95
Hours included	5	5	5	5	Unlimited	3	5
Fee for each additional hour	\$2.95	\$2.95	\$2.50	\$2.95	None	\$2.50	\$1.95
Monthly fee for unlimited access	N/A	N/A	\$19.95	N/A	\$17.95	\$24.95	\$19.95
Supports third-party Winsock applications	■	■	■	■	■	■	■
Browser	Proprietary	Spry Mosaic	Microsoft Internet Explorer 3.0	Proprietary	Proprietary	Netscape Navigator 2.01	Netscape Navigator 3.0
Software for Windows 3.x/Windows 95/Macintosh	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Web page space for each member	2MB	1MB	None	1MB	None	None	5MB
Includes HTML authoring tools	■	■	N/A	■	N/A	N/A	■
Number of e-mail addresses per account	5	1	1	5	6	1	1
User can specify e-mail address	■	■	■	■	■	■	■
IRC/newsgroup hosts	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Number of newsgroups provided	32,000	15,000	15,000	13,000	15,000	20,000	20,000
ISDN connections available	■	■	■	■	■	■	■
Technical-support number	800-827-6364	800-848-8990	800-386-5550	800-776-3449	800-936-7989	800-400-1447	800-745-2747

N/A—Not applicable: The service does not have this feature.

they'll need extensive training before beginning their Web voyages.—**DL**
EarthLink Network. EarthLink Network Inc., Pasadena, CA; 800-876-3151; www.earthlink.net. Circle 447 on reader service card.

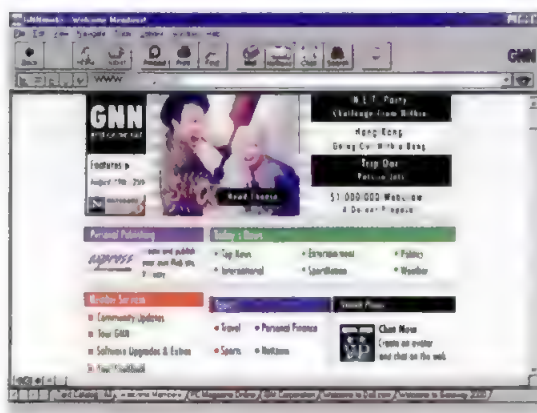
America Online Inc.

Global Network Navigator

Global Network Navigator, America Online's Internet-only service, is promoted as a supplement to AOL, but it doesn't go much beyond AOL's own suite of Internet tools and capabilities. At \$14.95 for 20 hours and \$1.95 for each additional hour, GNN is less expensive than AOL, but of course it also lacks AOL's proprietary content.

GNN is an attractive package if you don't already subscribe to AOL, unless you're looking for a flat-rate unlimited access plan, which GNN doesn't offer. GNN uses a Winsock that is compatible with any 16-bit third-party TCP/IP software, and the service gives users a whopping 20MB of server space for their home pages.

The GNN dialer installs and connects you to the GNN network in a matter of minutes, and asks if you want to down-



GNNworks, GNN's Web browser, has useful tabs at the bottom of its window for easy access to cached sites.

load the GNN Internet software supplement. This package—which takes 30 minutes to download over a 14.4-Kbps modem and automatically installs in less than 5 minutes—includes three client components: GNNworks, GNNmessenger, and GNNchat. GNN also provides a version of Netscape Navigator 2.0 that is optimized for the GNN Winsock.

GNNworks, the company's proprietary browser, lets you access Web sites, as well as FTP, Gopher,

and Usenet newsgroup sites. The browser expands on the classic history-list paradigm: Once GNNworks accesses a site and caches it, a tab representing that site is created at the bottom of the browser; you need only click on that tab in order to return to the page.

Unlike AOL's browser, however, GNNworks does not fully support HTML 3.0 extensions or Netscape frames; if you want to be able to access these features, you can use the version of Netscape Navigator provided by GNN.

Though you can view newsgroups adequately with GNNworks, GNNmessenger is a classic, full-featured news reader. It also doubles as the service's e-mail package, a welcome feature that lets you post messages or send them via e-mail from the same window. (GNN

gives you one e-mail address per account.) For live messaging, GNN includes GNNchat, a full-blown IRC client that connects directly to the company's

SUITABILITY TO TASK

Global Network Navigator

Setup and orientation	Excellent
Software	Good
E-mail and Internet services	Good
Technical support	Good

PROVIDERS

EarthLink Network	Global Network Navigator	GTE Internet Solutions	IBM Internet Connection Service	IDT Internet Services	MCI Internet	MindSpring	Netcom	SpryNet	Whole Earth Networks
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302	550	200	450	487	300	230	230	460	320
None	None	None	None	None	None	\$35	None	None	\$20
\$19.95	\$14.95	\$8.95	\$4.95	\$19.95	None	\$6.95	\$19.95	\$4.95	\$10.00
Unlimited	20	5	3	Unlimited	5	5	Unlimited	3	5
None	\$1.95	\$1.95	\$1.95	None	\$2.50	\$2.00	None	\$1.95	\$2.00
\$19.95	N/A	\$19.95	\$19.95	\$19.95	\$19.95	\$26.95	\$19.95	\$19.95	\$25.00
■	■	■	■	■	■	■	■	■	■
Netscape Navigator 2.0	Proprietary	Netscape Navigator 2.01	Netscape Navigator 2.02	Netscape Navigator 2.01	Microsoft Internet Explorer 3.0	Microsoft Internet Explorer 3.0	Netscape Navigator 2.01	Microsoft Internet Explorer 2.0	Netscape Navigator 2.02
■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■	■■■■
2MB	20MB	1MB	None	None	None	5MB	1MB	5MB	20MB
■	■	■	N/A	N/A	N/A	■	■	■	■
1	1	1	6	1	1	1	1	1	1
■	■	■	■	■	■	■	■	■	■
■	■	■	■	■	■	■	■	■	■
21,373	25,000	28,000	19,000	23,000	12,000	20,000	17,000	15,000	25,000
■	■	■	■	■	■	■	■	■	■
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own IRC server. For some, GNN's most attractive perk will be the 20MB of Web page space it gives to each account holder. You must download extra software from GNN for creating and editing Web pages, but the programs are both intuitive and easy to use.—CM

Global Network Navigator. America Online Inc., Vienna, VA; 800-819-6112; www.gnn.com. *Circle 441 on reader service card.*

GTE Corp.

GTE Internet Solutions

GTE—the largest local telephone company in the U.S.—has gone nationwide via the Internet. The company provides simple-to-install Internet access, reselling UUNet Technologies' dial-up access in most locations. New users will find the included software and technical support appealing, and more experienced users will enjoy the company's generous access terms and the flexibility of being able to use whatever software they choose.

The GTE service comes with a customized version of the Netscape Navigator 2.01 Personal Edition browser. For Windows 95 clients, GTE uses Dial-Up Networking to connect; Windows 3.x users get a separate package that includes a dialer. Monthly billing options include unlimited access for \$19.95, or 5 hours for \$8.95, plus \$1.95 for each additional hour. As with AT&T and MCI, if you're an existing GTE phone service customer you have the option to add your Internet charges to your phone bill. GTE also includes unlimited e-mail for one user (extra mailboxes are available at additional cost) and 1MB of server space for hosting your Web page.

We performed the Windows 95 installation in about 15 minutes, using helpful setup wizards to configure our modem and e-mail account and the Navigator browser. Once you've logged on, Navigator takes you to GTE's clearly categorized home page. There you'll find 16 link buttons for different topics of interest, including business, entertainment, education, news, sports, and a

children's section. Internet links include hot Web sites, chat, numerous search engines, and a section called "Your Site" that helps GTE Internet Solutions users create their Web home pages. The "Your Site" area includes links to documentation, along with tutorials on HTML, images, and animation. You can also create pages off-line and upload them using FTP.

Using Navigator, you can access newsgroups and e-mail. GTE doesn't give you the abundance of applications for IRC, FTP, and telnet that come bundled with services like MindSpring and Netcom, but the GTE home page and

technical-support areas will direct you to shareware and commercial versions of these tools. We were usually able to speak with a representative at GTE's telephone

support center after a short wait, and the staff was diligent in responding to our requests.—Jeffrey G. Witt

GTE Internet Solutions. GTE Corp., Irving, TX; 800-363-8483; www.gte.net. *Circle 448 on reader service card.*

IBM Corp.

IBM Internet Connection Service

Big Blue is covering the blue planet with its corporate-targeted Global Network, and IBM Internet Connection Service lets you tap into this backbone for \$19.95 per month for unlimited connection time (or \$14.95 per month for 3 hours, plus \$1.95 for each additional hour). Although reliability and technical support are top-notch, IBM Internet Connection Service lacks features that some users will miss: Like AT&T WorldNet Service and MCI Internet, no server space or tools for Web page creation are available with Internet Connection.

IBM Internet Con-



nection Service consists of a Windows 3.x-based dialer program, a 16-bit Winsock, and Netscape Navigator 2.02. No other client software is included, so by default you're limited to Netscape's e-mail and newsgroup capabilities. You can, however, use any standard Winsock client

software with the service. The middleman between your dialer software and IBM's Global Network is Advantis, IBM's U.S. access provider, which has more than 450 points of presence.

After a painless setup process, which locates your nearest Advantis access number via a toll-free call, you're ready to surf. When you first connect, Netscape loads the IBM Internet Connection Service home page, which features buttons for searching, links, new users, help, user services, and daily featured Web sites.

Your default e-mail address is the same as your account's user ID. With an individual account, you can set up five additional user IDs as part of the basic service. It's easy to change any of these addresses, and you can even have e-mail forwarded to another Internet address. While IBM maintains its own newsgroup servers, some users have complained that the news feed isn't updated as quickly as it is with other ISPs.

IBM's technical support for Internet Connection is first-rate. We never had to wait more than a few minutes to speak with a service representative, and the staff was knowledgeable. There are also plenty of FAQs and Web forms for reporting problems, as well as three newsgroups that garner regular responses from company representatives.

Because it lacks Web-page hosting, IBM Internet Connection Service won't appeal to some users. On the plus side, however, you can generally expect good reliability and support from IBM.

—Michael Muchmore
IBM Internet Connection Service. IBM Corp., White Plains, NY; 800-455-5056; www.ibm.net. *Circle 449 on reader service card.*

SUITABILITY TO TASK

GTE Internet Solutions

Setup and orientation	Good
Software	Good
E-mail and Internet services	Good
Technical support	Good

SUITABILITY TO TASK

IBM Internet Connection Service

Setup and orientation	Good
Software	Good
E-mail and Internet services	Fair
Technical support	Excellent

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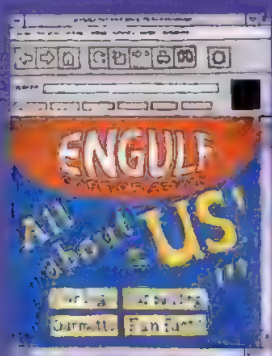
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IDT Corp.

IDT Internet Services

IDT—like MindSpring—now provides Internet service nationwide through its agreement with PSINet to use that service's network system and points of presence (POPs). IDT offers Internet access via the Netscape Navigator 3.0 Web browser and telnet and chat clients, but the service doesn't give beginners a very good introduction to the Internet. With standard pricing at \$19.95 per month for unlimited access, experienced users may want to try IDT Internet Services but novices will find more elsewhere.

IDT's basic service doesn't include Web page hosting. IDT does host home pages for subscribers to its premium service (\$29.95 per month for unlimited access), which includes 8MB of server space for Web pages. But IDT offers minimal assistance with creating Web pages or uploading them to IDT's servers. The premium service also includes two e-mail accounts.

Installation was fairly straightforward, using configuration wizards. After the software installs Netscape Navigator and IDT's dialer, you must reboot your system. Windows 95 users currently running MSN will have a problem running IDT; we had to change the name of the Winsock so that it wouldn't conflict with IDT's software. We found the technical support staff helpful in solving this problem.

When you connect to IDT, Netscape Navigator automatically pulls up the IDT home page—and then you're left to fend for yourself. IDT does provide limited guidance for novices on how to use the Web. To help you get started, the browser includes about 50 bookmarks to sites such as *The Wall Street Journal's* investment site and SportsLine USA. The IDT home page also links you to the Genie Web site—formerly an online service—which IDT recently purchased.

IDT assigns you an e-mail address, although you can ask IDT's customer service to change or customize it for you. IDT's server provides access to 23,000 newsgroups, which you can browse using Navigator or a third-party news reader. For Internet chat, IDT provides mIRC32;

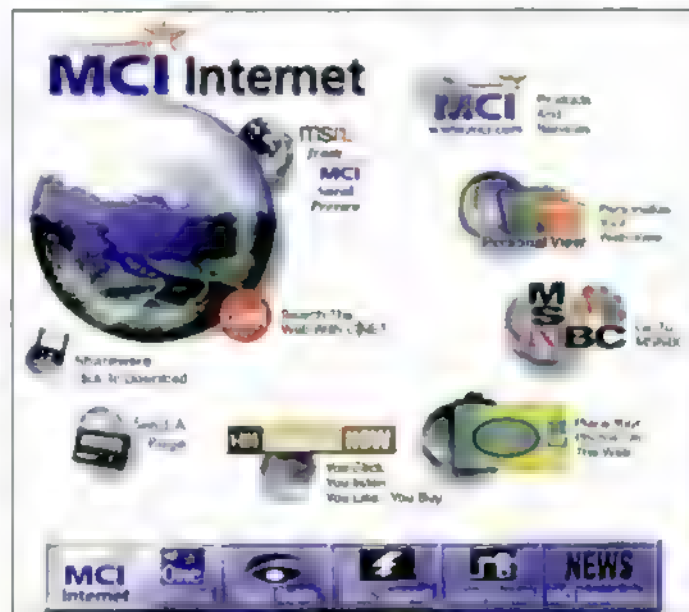
you can choose from among roughly 4,000 channels.—*STE*

IDT Internet Services. IDT Corp., Hackensack, NJ; 800-245-8000; www.idt.net. Circle 450 on reader service card.

MCI Communications Corp.

MCI Internet

While MCI focuses on Internet services for businesses, we looked at its consumer access offerings. There are two ways consumers can get Internet



MCI Internet's starting Web page is colorful, but it's not very useful for beginners.

access from MCI: You can sign up for MCI One (which includes long-distance phone service, Internet access, and pager service), or you can order the standalone

MCI Internet service—whether or not you use MCI's long-distance service. With either plan you receive 5 free hours of access per month and then pay \$2.50 for each additional hour. With MCI Internet you can choose the unlimited-access plan for \$19.95 per month, but if you're subscribing through MCI One you can't.

Some users will find the service limited: MCI provides no Web page hosting, no news reader, and little guidance for new users. The only printed documentation is a small pamphlet that tells you how to install the included software.

MCI Internet comes with Microsoft Internet Explorer 3.0, a dialer program for Windows 3.x (for Windows 95, MCI uses the Dial-Up Networking dialer, as

well as Windows 95's FTP and telnet clients), a proprietary e-mail client, and the PointCast Network, a customizable online news service. Because MCI uses a standard Winsock, you can also use any third-party Internet software.

During installation, MCI Internet takes you online to find a local access number from among 450 nationwide. When you first log on you see MCI's home page, which is populated with advertisements for MSNBC and 1-800 MUSIC NOW, MCI's music CD sales division. There's a "Personal View" section, which displays nine general-interest topics including business, entertainment, news, and shopping. The only obvious search link takes you to CNET's Web site; we would have expected a search engine like Lycos.

MCI Internet lets you have only one e-mail address, which you can customize when you first sign up. The e-mail client that MCI provides is one of the package's stronger features. It offers folders to organize your mail, an address book, and support for multiple binary attachments. You can use Microsoft Internet Explorer to access MCI's well-stocked newsgroup server. The telnet and FTP clients are

bare-bones, however, and no Internet Relay Chat service is provided.

You can't go wrong taking advantage of the 5 free hours per month of Internet access. But if

you need more hand-holding or want to put up your own Web page on the Internet, you should shop around.—*MM*

MCI Internet. MCI Communications Corp., Arlington, VA; 800-550-0927; www.mci2000.com. Circle 451 on reader service card.

MindSpring Enterprises Inc.

MindSpring

MindSpring—with its recent acquisition of PSINet's InterRamp and Pipeline consumer accounts, along with access to PSINet's network points of presence—is now a national ISP. The company's strong software package and excellent customer service will be popular with users moving from traditional online services to the Internet. However, MindSpring's \$35 start-up fee and its pricing—

SUITABILITY TO TASK

IDT Internet

Setup and orientation	Fair
Software	Good
E-mail and Internet services	Fair
Technical support	Fair

SUITABILITY TO TASK

MCI Internet

Setup and orientation	Fair
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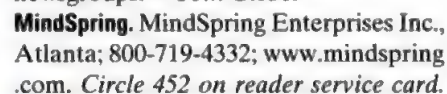
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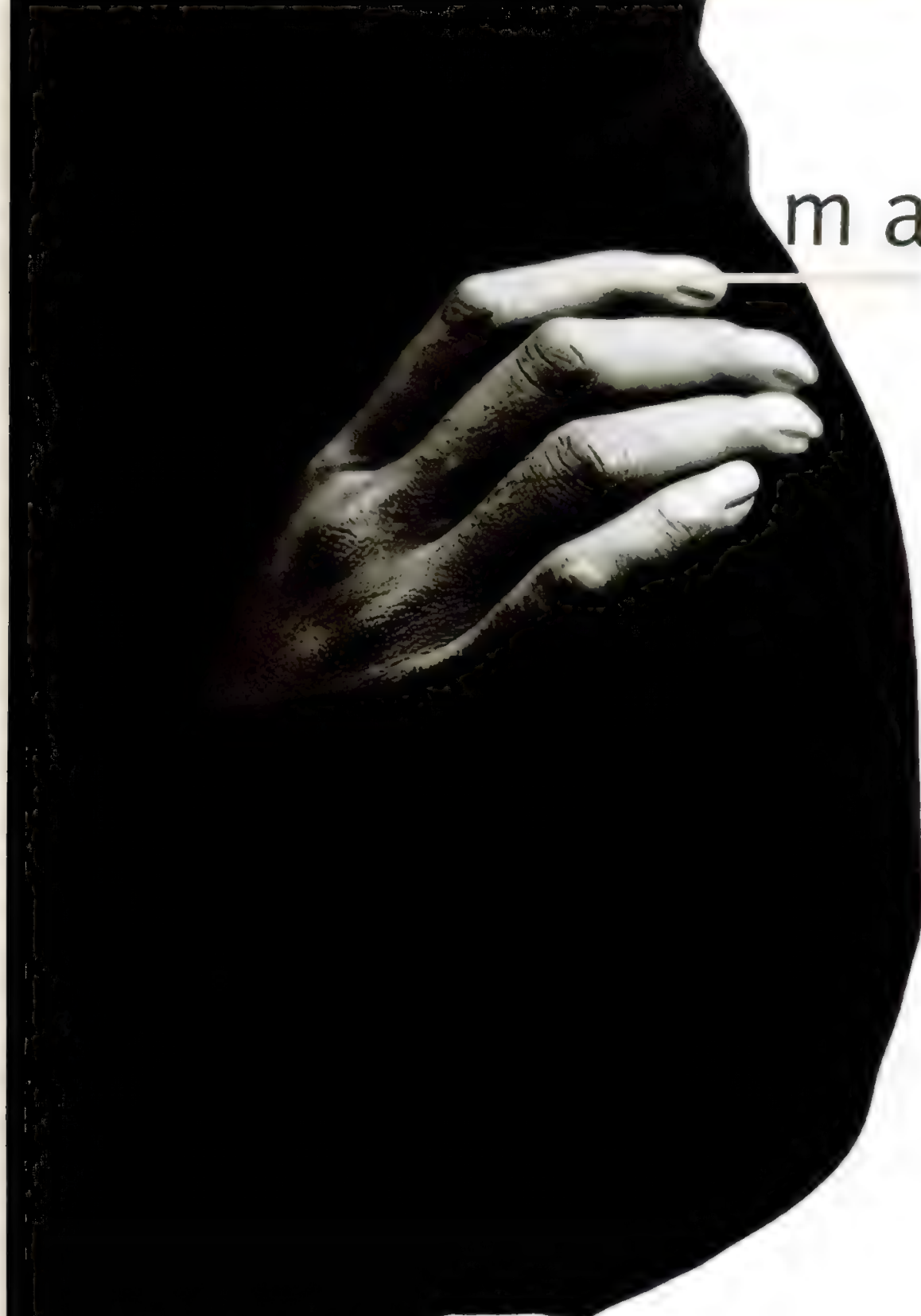


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A black and white photograph of a hand holding a pen, poised to write on a dark, textured surface. The hand is illuminated from the side, creating strong highlights and shadows. The pen is a simple, light-colored ballpoint pen. The background is a dark, textured surface, possibly a piece of paper or a book cover.

m a d e

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Microsoft *Natural*
Keyboard

Netcom On-Line Communication Services Inc.

Netcom

Netcom, one of the country's largest Internet service providers, offers just one pricing scheme that's now the industry standard: unlimited access for \$19.95 per month. In addition, new Netcom users pay only \$5 for the first month of service. NetCruiser, the service's proprietary software package, bundles several Internet applications including Netscape Navigator 2.01 within a single interface, but the tools have limited features and users will soon become frustrated. However, those willing to install their own applications and Winsock can bypass the NetCruiser package.

NetCruiser installs easily, and automatically takes you online to set up an account and find a local access number. Actually connecting to the service, however, is not so easy. NetCruiser has no on-screen status indicator during log-on, and the process can sometimes take an unusually long time:

SUITABILITY TO TASK	
Netcom	
Setup and orientation	Good
Software	Fair
E-mail and Internet services	Good
Technical support	Fair

Several minutes can pass between the modem handshake and the time Netscape loads Netcom's Homeport page—the only way you'll know you're connected.

Aside from Netscape Navigator 2.01, the NetCruiser software includes the bare minimum you need to use e-mail, Internet Relay Chat, newsgroups, and other Internet features. The package currently uses 16-bit software, although the company's 32-

bit Netcomplete 3.0—which will include Microsoft Internet Explorer—should be available by fall. None of the modules can be accessed until NetCruiser actually logs on to Netcom's servers, so you can't compose or read mail or newsgroup messages off-line. Netcomplete will not have this limitation.

The Homeport Web site is the gateway to the Web for Netcom users, offering up-to-the-minute news feeds and links to major Web sites, arranged by category. Homeport is also the starting point for Your News and Your Finances, two customizable Web-based services, and also for

a service called Your Web Page (users receive 1MB of server space for Web pages).

Netcom has Web support available around the clock, but you must make a toll call and the average wait is about 30 minutes, depending on the time of day. Three Netcom-sponsored newsgroups offer announcements and FAQs, but the group dedicated to tech support is unmoderated and cluttered with irrelevant questions.—*TG Netcom*. Netcom On-Line Communication Services Inc., San Jose, CA; 800-638-2661; www.netcom.com. **Circle 453 on reader service card**

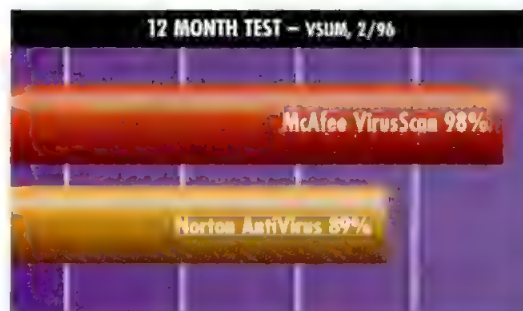
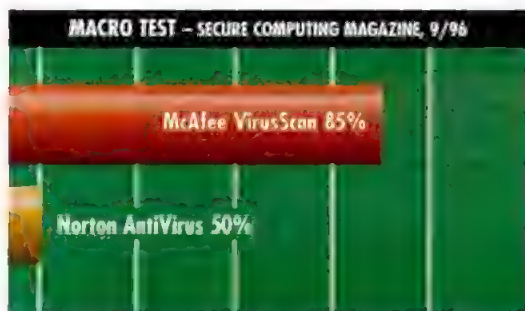
CompuServe Internet Division

SpryNet



SpryNet provides Internet access that is easy to set up and includes a good suite of software and tools to get you started. SpryNet offers an unlimited-access plan via CompuServe's nationwide network for \$19.95 per month. It also offers two alternative monthly plans, which

WHO SAYS VIRUSSCAN'S MACRO



VIRUS RESEARCHERS.



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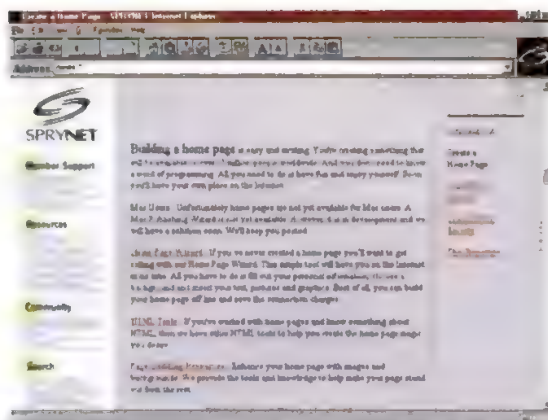
But for some reason, word hasn't reached our friends at Symantec. In a series of highly misleading ads, they claim Norton AntiVirus is superior virus protection.

Fortunately for you, those claims have been exposed and publicly condemned by

everyone from NCSA and *Virus Bulletin* to *Information Week*. The *San Jose Mercury News* referred to the incident as, "Symantec's little fib."

In Symantec's latest ad, they "test" Norton AntiVirus against VirusScan in detecting Word macro viruses. What they don't tell you is that they designed the test, supplied only the viruses that they could detect, and paid for the test themselves. *Secure Computing* calls the results "speculative."

At McAfee, we don't manipulate virus detection tests. We don't have to. As



SpryNet's site is stocked with helpful information and tools, including great software for creating Web pages.

cost \$4.95 for 3 free hours or \$9.95 for 7 free hours, plus \$1.95 per hour.

We reviewed SpryNet's 16-bit software package, which includes SpryNet Internet Explorer (a customized version of Microsoft Internet Explorer 2.0), SpryNet Dialer, SpryNet Access Phonebook, and SpryNet Mail. The Access Phonebook lets you locate access phone numbers nationwide. The included e-mail client is well designed

Networking client to connect to the service. Even if you aren't using this package, the SpryNet Web site provides detailed instructions on downloading and installing the Win 95 Dial-Up script.

Setting up SpryNet couldn't be smoother. To get the Starter Kit you can either download it

and easy to use, though SpryNet members can also download the more full-featured BeyondMail Personal Edition free. SpryNet allows just one e-mail address per account. You can access SpryNet's newsgroups through the SpryNet Web browser or use any news reader you choose.

By the time you read this, SpryNet will have released a 32-bit software option, which will include Internet Explorer 3.0 and a 32-bit version of SpryNet Mail. As with some other ISPs' packages, SpryNet's 32-bit software will use the Windows 95 Dial-Up

from the Web site or order the disks from SpryNet. After you enter your account information and choose your e-mail address, you're ready to surf. SpryNet offers additional Internet features, such as Internet Relay Chat with the service's Spry Chat software, and includes a Net Tools area that offers downloads of Internet software.

SpryNet allows 5MB of server space per account and offers great tools to help you create your home pages. From Spry's Web site, you can download CompuServe's Home Page Wizard—a graphical tool that lets you easily assemble your page—and the Publishing Wizard, which automates uploading your site to SpryNet. You can use any HTML editor you choose; SpryNet suggests several tools and includes useful links to HTML tutorials.

SpryNet's site has links to popular search engines and current news sites, a guide to interesting events on the Web, and a tutorial section for new users. SpryNet provides 24-hour on-line technical support via

SUITABILITY TO TASK

SpryNet

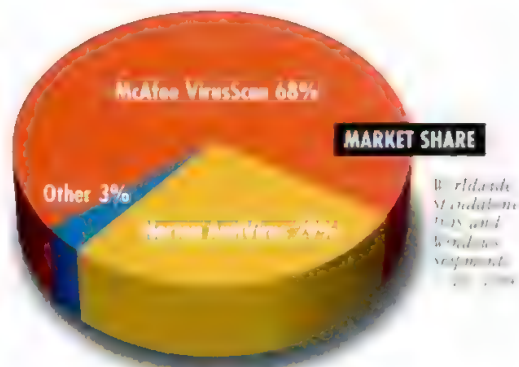
Setup and orientation	Excellent
Software	Good
E-mail and Internet services	Good
Technical support	Good

VIRUS PROTECTION IS THE BEST?

"McAfee beat all other products in macro virus detection."
— Secure Computing Magazine

"Symantec's macro virus tests show flaws and may be biased." — NCSA

"The results show the technology is there for McAfee to come up trumps."
— Virus Bulletin



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YOU.

you can see from the independent tests above, VirusScan has consistently proven to provide the best protection from not only macro viruses, but viruses of all kinds.

The world's most trusted name in anti-virus.

Maybe that's why McAfee is trusted by over 25 million users, more than all others combined. And maybe that's why 80 of the Fortune 100, and most of the Fortune 500, rely on McAfee for client/server virus protection.



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chat, but telephone support (not toll-free) is available only from 9:00 A.M. to 9:00 P.M. eastern time weekdays and from 11:00 to 8:00 weekends.—*MJP*

SpryNet. CompuServe Internet Division, Bellevue, WA; 800-777-9638; www.sprynet.com. Circle 454 on reader service card.

Whole Earth Networks

Whole Earth Networks

The WELL and Hooked joined forces this year to form a single ISP called Whole Earth Networks. At press time, its services were in transition as Whole Earth Networks consolidated access and software offerings. The WELL, an electronic community, will concentrate on its trademark online conferences. The WELL's ISP services will join with those of Hooked to provide connection services and support. For now, you may find that other ISPs in this roundup provide a better fit in terms of basic software and support.

Whole Earth Networks offers a number of ways to obtain Internet access. Currently, Hooked accounts cost \$25 for unlimited access from San Francisco or Los Angeles, and include 20MB of server space for Web publishing. For customers outside California, The WELL offers access through its Nationwide Plan, which costs \$20 per month for 20 hours, plus \$2 for each additional hour, and requires a \$40 setup fee. Access to The WELL's conferences costs an additional \$4.95 per month for Nationwide Plan and Hooked members.

The WELL's conferences, which comprise more than 260 discussion areas, form its unique and alternative service. You can cruise through a variety of subjects: There are groups devoted to science, spirituality, cooking, horticulture, and music, to name a few. If you already have Internet access, you can join WELL conferences for a flat \$15 per month and also get half a megabyte of server space for your Web site.

We tested Whole Earth Networks' WholeWorks software for accessing either The WELL or Hooked. The version we saw included Netscape Navigator 1.1, telnet and FTP utilities, and Eudora Lite e-mail. Upcoming versions will include Navigator 2.02 and should be shipping by fall. The new versions use Windows 95 Dial-Up Networking, though users still log on through a terminal screen. Both services offer Win-

dows 3.x and Macintosh software. WholeWorks includes an extensive setup guide and a customized Netscape guide.

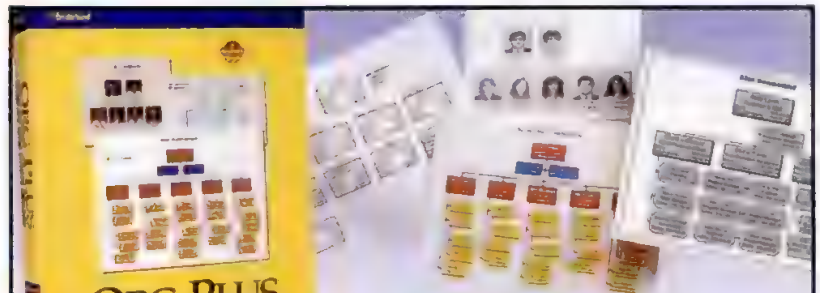
Forms for Web-page creation weren't available at either The WELL or at Hooked's site during our testing, but numerous links were available for other HTML packages. The

SUITABILITY TO TASK

Whole Earth Networks

Setup and orientation	Fair
Software	Fair
E-mail and Internet services	Fair
Technical support	Fair

Whole Earth Networks. Whole Earth Networks, San Francisco; 800-935-5882; www.wenet.net. Circle 455 on reader service card.



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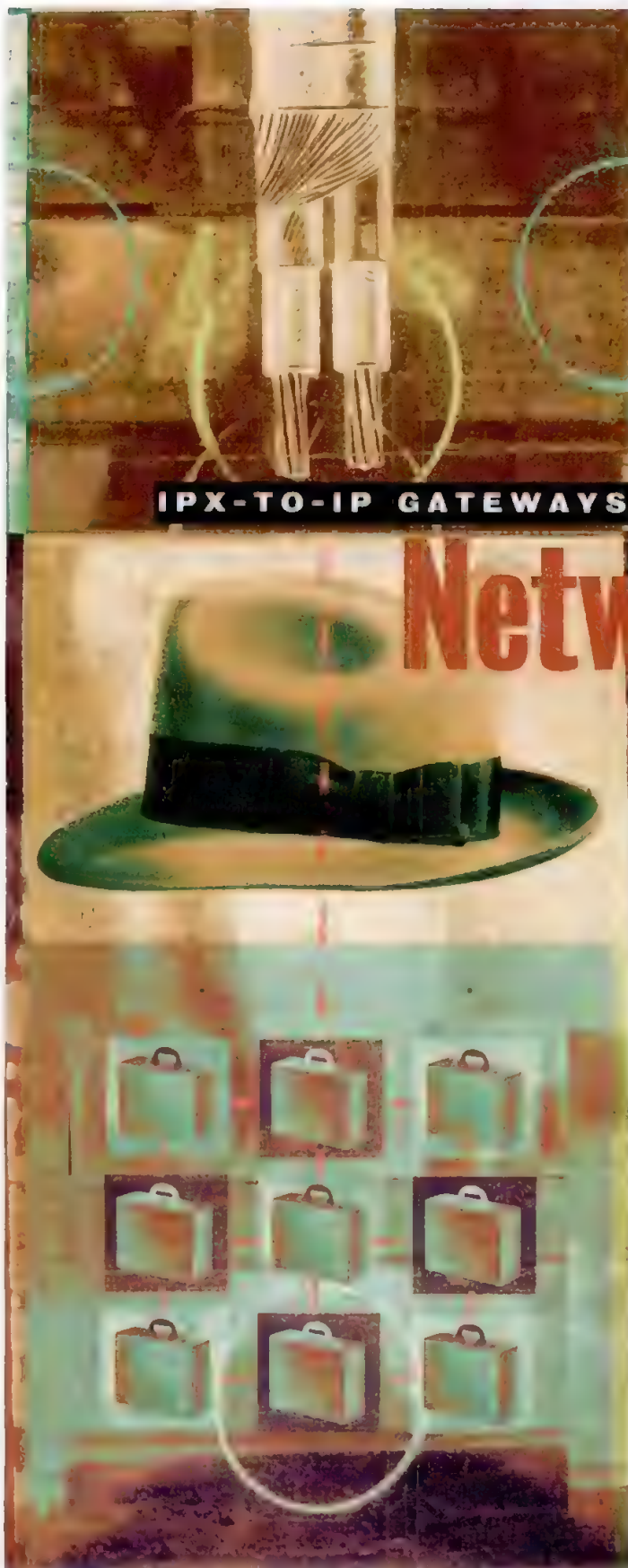


ILLUSTRATION BY JENNIFER JESSEE

Still think giving employees Internet access is a huge productivity killer? Think again. As a tool for communication and collaboration, the Internet is becoming an indispensable instrument for businesses both large and small. Internet services such as e-mail and Web browsing open up new ways of gathering and sharing information. In addition, we have seen an explosion in the use of Internet software and services on internal networks. These *intranets*, as they are called, provide common tools across multiple platforms.

Link Your Network to The Net

An IPX-to-IP gateway can provide easy and manageable Internet access.

By Padraic Boyle

With both the Internet and the intranet becoming business necessities, there's an increasing need for TCP/IP, the protocol at the center of these two environments. However, most businesses today have local area networks that run IPX, the protocol of Novell's NetWare. By

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PERFORMANCE TESTS

IPX-to-IP Gateways



The gateways showed similar performance on our ISDN tests (limited by the ISDN connection itself) but

Instant Internet was the leader among the hardware products in an intranet setting.

What the Numbers Mean

The throughput of each of these IPX-to-IP gateways when connecting to the Internet is limited by the 128-Kbps ISDN connection and the unit's compatibility with the service provider's ISDN hardware. We found that Instant Internet and WebRamp offered similar performance over ISDN. With compression, they provided slightly more than the 128-Kbps data throughput available over ISDN. The products used Multilink PPP (MP) to combine the two 64-Kbps B-channels of basic-rate ISDN. However, the MP implementation of the Cisco IPeXchange 1004 was unable to sustain a 128-Kbps link with our ISP, so its performance reflects throughput over one B-channel only.

In our testing over an Ethernet network, Instant Internet had the best performance of the turnkey solutions, with nearly four times the throughput of IPeXchange or WebRamp. But we were able to build more scalable (though more expensive) solutions on Pentium servers with two of the software-based gateways we tested, Quarterdeck's IWare Connect and Firefox's Nov*ix for Internet. The gateways' throughput over Ethernet is important as you consider the number of clients on your network. Instant Internet's better throughput over the LAN indicates that it can service more clients than either the IPeXchange or WebRamp units. In any case, none of the gateways matched the performance of native TCP/IP. Over the network, a Windows 95 client running TCP/IP natively was four times as fast as any of the software-based or turnkey IPX-to-IP gateways.

To boost throughput, IPeXchange and IWare use a session protocol between the IPX client and the gateway called Streams, instead of the SPX protocol that some other gateways use. But

our file-transfer tests did not show the benefits of Streams' variable packet size and lower acknowledgment overhead.—*Analysis written by Jeffrey G. Witt*

How We Tested

We set up our **Ethernet File Transfer** test on a 10-Mbps network. Our NetWare 4.1 server ran on an HP NetServer 5/66 LF with 64MB of RAM. We configured the Compaq Deskpro client with Microsoft Windows for Workgroups 3.11 and 16MB of RAM. We downloaded a 100K file to the client through each IPX-to-IP gateway from an HP NetServer LX Pro server running Microsoft Windows NT Server 3.51 with 256MB of RAM. On the client, we used Ipswitch's WS_FTP. For the **ISDN File Transfer** test we used the same client and connected to the Internet using both B-channels of the gateway's ISDN adapter. From an FTP server, we downloaded a 1MB file.

Ethernet File Transfer	
Kilobits per second	
HARDWARE/SOFTWARE	
Cisco IPeXchange 1004	620
Instant Internet	2,150
WebRamp IPX Gateway	543
SOFTWARE	
Cisco IPeXchange Internet Gateway*	1,340
IWare Connect	2,810
Nov*ix for Internet	2,910
*NLM version	BETTER ►
ISDN File Transfer	
Kilobits per second	
HARDWARE/SOFTWARE	
Cisco IPeXchange 1004	71
Instant Internet	137
WebRamp IPX Gateway	138
	BETTER ►

mid-1996 there were 57 million users on NetWare networks, representing close to 60 percent of all network users, according to the market research firm IDC. To connect clients on IPX-based networks to the Internet, you have two options. One is to install TCP/IP natively, which can be costly and difficult to manage; the other is to set up an IPX-to-IP gateway that translates between the two protocols.

Even though desktop operating systems

such as Microsoft Windows 95, Microsoft Windows NT Workstation, and IBM's OS/2 Warp include TCP/IP, network administrators still fall prey to the management overhead of the protocol. You must provide an IP address for each client—and if you're connecting to the Internet, you'll have to ensure that the addresses are globally unique (see "TCP/IP on the LAN: Going Native" for more information on setting up TCP/IP on your network). More-

over, connecting your network to the Internet using TCP/IP introduces a potential security problem, and so requires a firewall to keep out unauthorized visitors.

ENTER THE IPX-TO-IP GATEWAY

IPX-to-IP gateways provide a centralized, secure solution for connecting IPX-based LANs to IP networks. An IPX-to-IP gateway can use a single IP address for the entire NetWare LAN—or any network running the IPX protocol—eliminating the configuration and maintenance headaches introduced by having to support IP addresses for all client PCs. Moreover, these solutions are easy to use and offer management features that let you control users' ac-

Our Contributors: PADRAIC BOYLE and STEVE RIGNEY are contributing editors of *PC Magazine*. ERIC HARPER is a networking consultant and freelance writer. AMY LEUNG is a technical analyst and ANDREW GO is a support technician at *PC Magazine*. TODD SPANGLER was the associate editor in charge of this story, and JEFFREY G. WITT was the project leader.

cess privileges—so you can ordain when and where your employees may roam on the Internet.

You can purchase IPX-to-IP gateways as either turnkey hardware/software solutions or as software-only packages. In our roundup we look at hardware/software solutions that include an ISDN adapter for connecting to the Internet. We review three gateways: Cisco Systems' IPeXchange 1004, Performance Technology's Instant Internet, and Trancell Systems' WebRamp IPX Gateway. These gateway products are designed for networks of up to 50 users, and they're limited primarily by the maximum 128-Kbps throughput of ISDN. Larger installations will need one or more high-speed dedicated lines, connected to the Internet via a router. Optionally, IPeXchange and Instant Internet are available for leased-line or frame-relay connections.

We also looked at two of the leading software-only IPX-to-IP products, Quarterdeck Corp.'s IWare Connect and Firefox Communications' Nov*ix for Internet (see the sidebar "The Software Side of IPX-to-IP Gateways"). Each product runs directly on a NetWare server as a NetWare Loadable Module (NLM). Other software-based gateways are available for NetWare as well as other platforms. Novell's new IntranetWare bundle—which will ship this fall—will also include an IPX-to-IP gateway component.

Software-only IPX-to-IP gateways are good solutions for those who want to purchase their own hardware with which to

Editors' Choice

• Instant Internet



For NetWare administrators, connecting to the Internet and working with TCP/IP can be like learning Esperanto.

Performance Technology's Instant Internet, our Editors' Choice, eases the process of linking IPX networks to the Internet. The product is a complete solution that is both easy to use and flexible enough to adapt to various bandwidth needs. Its Internet connection options include a modem, ISDN adapter, or an Ethernet adapter for WAN links.

Instant Internet installs very easily and simplifies connecting to your Internet service provider. It includes connection scripts for several hundred ISPs. If your Internet service provider is not listed, Performance Technology will write a script for you. The management features of Instant Internet are extensive, with the capability—unique

connect to the Internet. In contrast, the turnkey hardware/software combinations give you a complete solution for hooking up your IPX network to the Net.

SECURITY: THE "INVISIBLE" LAN

Besides the logistics of getting connected to the Internet, security is the number-one issue on the minds of network managers. An IP network is a peer-to-peer en-

vironment, where every client and server on the network is a potential host that can share data. This is great for collaborating, but it may provide someone with access to information you wanted to keep private.

One of the inherent design features of IPX-to-IP gateways is that they do not allow IP traffic across the gateway barrier into the land of IPX. If wily hackers do attempt to attack your gateway, they will

among products in the main roundup—to import users from the NetWare Bindery or from Novell Directory Services (NDS). Of the other two products we reviewed, WebRamp was also easy to set up, but didn't have as many configuration options or management features as Instant Internet. Cisco IPeXchange 1004 was difficult to configure and lacked management and reporting capabilities.

For those who want to purchase hardware separately, software-only IPX-to-IP packages are a good choice. But unlike the turnkey gateways, neither of the packages we looked at—Quarterdeck's IWare Connect and Firefox Communications' Nov*ix for Internet—works with 32-bit TCP/IP software.

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IPX-TO-IP GATEWAYS

How to Read the Suitability to Task Boxes

Setup and installation We look at each product's ability to provide all the hardware and software needed to connect an IPX network to the Internet over an ISDN link. We prefer products that include installation scripts and graphical wizards to guide the administrator through the setup process. We look for clear instructions for configuring ISDN parameters and diagnostic tools for troubleshooting. The best products can import users and groups from the current network's database. The product should provide client software that is easy to distribute. We give higher marks to packages that include Internet applications such as Web browsers, e-mail clients, FTP clients, and news readers. We expect the client software to work

with a variety of third-party 16- and 32-bit programs. The client software should work with existing network hardware and drivers without altering the client's network configuration.

Administration and management We rate the tools the product gives you to regulate your Internet investment. We evaluate each product's ability to control access to Internet applications and track hardware statistics. We consider whether the product lets you restrict access to Web sites, Gopher, Internet Relay Chat, or newsgroups. We give higher ratings to gate-

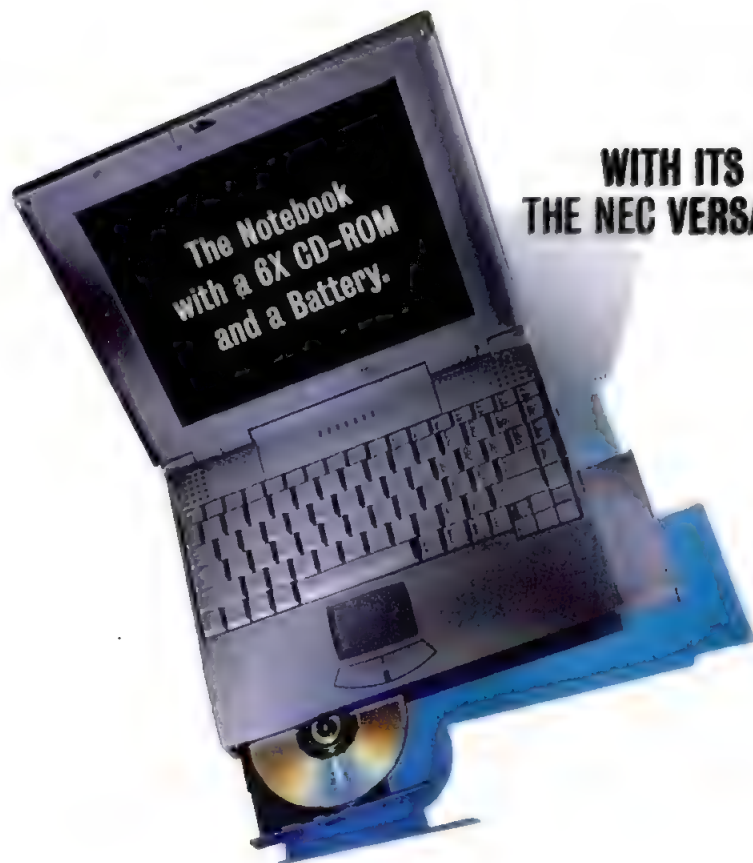
SUITABILITY TO TASK

Product name

Setup and installation	Good
Administration and management	Excellent

ways that can track client usage and let you set limits by individuals, groups, and time of day. The product should also have facilities for monitoring unauthorized

access attempts. We look for real-time monitoring as well as logging, so administrators can keep an eye on traffic. We give extra marks to products that include load balancing among multiple devices and SNMP agents for larger networks. We rate any utilities that report on the condition of the ISDN line, the number of packets sent and received, and total connect time. All management functions must be accessible from a single client PC anywhere on the LAN.



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NEC



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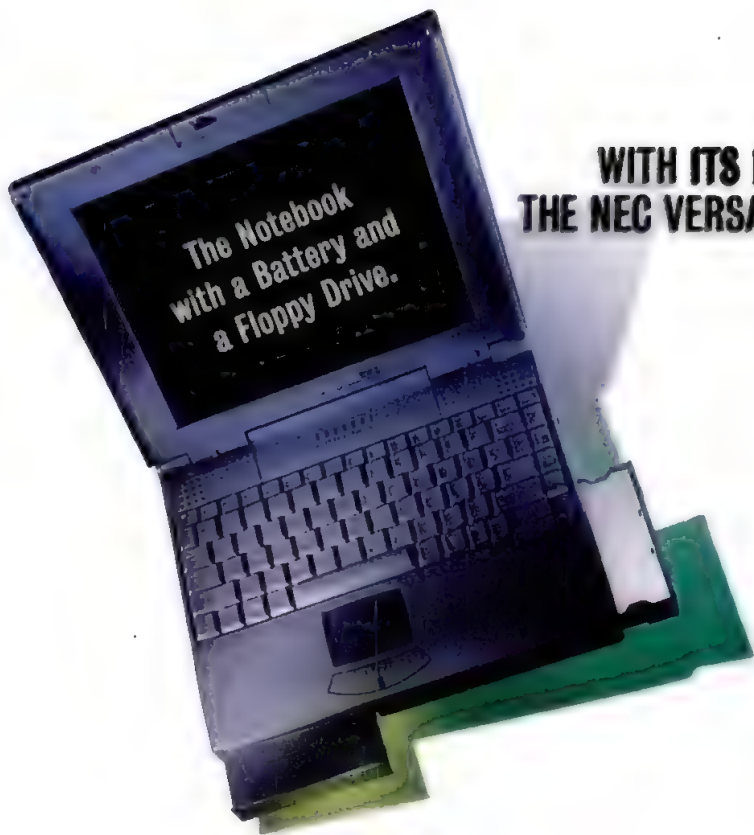
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only see your external IP address and possibly the TCP/IP stack, but nothing of any use to them. Because of this design, IPX-to-IP gateways are, in a sense, pared-down firewalls that protect your data from prying eyes on the Internet and intranet.

GETTING CONNECTED

To access the Internet, you'll need to connect to it through an Internet service provider (ISP). The most common way to connect to an ISP is with an analog 28-Kbps modem. Though it's possible to connect all your employees using individual modems at their desktops, providing extra telephone lines and modems for each user would be costly—and difficult to manage. (For reviews of single-user accounts, see "The Net Grows Wider" in this issue.)

Many ISPs also offer higher-speed digital connections for their business customers. For the gateway products we review in this feature you'll need an ISP that can provide ISDN service, and you'll also need to request an ISDN line from your local telephone company. For more information, see "Choosing an Internet Service Provider for Your Business."

HOW THEY WORK

The turnkey IPX-to-IP gateways we review follow the same general design: Each has a 10Base-T Ethernet port, a built-in ISDN BRI (basic-rate interface) port, and a Winsock 1.1-compliant driver for clients. When a client runs a Winsock application, such as a Web browser, the requests go to the IPX-to-IP gateway. If it's not already connected, the gateway dials up the ISP and sends the client's requests to the Internet. In the intranet scenario, the Winsock simply accesses the local host without going out through the Internet connection. This all takes place transparently in the background.

Performance with these gateways is related mainly to the amount of bandwidth between the gateway and the ISP. On our ISDN test, Instant Internet and Web Ramp performed neck and neck. Cisco IPeXchange was unable to sustain a full 128-Kbps connection with our Internet service provider. Over higher-bandwidth connections native TCP/IP will give you better performance, but you'll give up the built-in management, security, and ease that IPX-to-IP gateways offer.

Cisco Systems Inc.

Cisco IPeXchange 1004

ALL REVIEWS BY PADRAIC BOYLE

The routing giant Cisco Systems continues its full-court press into the Internet market with its IPeXchange 1000 Series Internet Gateway product family. Teaming one of its low-end routers with its IPX-to-IP software, the

Cisco IPeXchange 1004 (\$2,695 for a 20-user license, \$3,950 for 50 users) offers Internet access for IPX clients in one package. We found the IPeXchange difficult to configure, lacking in management and logging features, and slower than Instant Internet on our performance tests.

Cisco's IPeXchange Internet Gateway solution comes in two pieces: the router and the client software. The IPeXchange

By Eric Harper

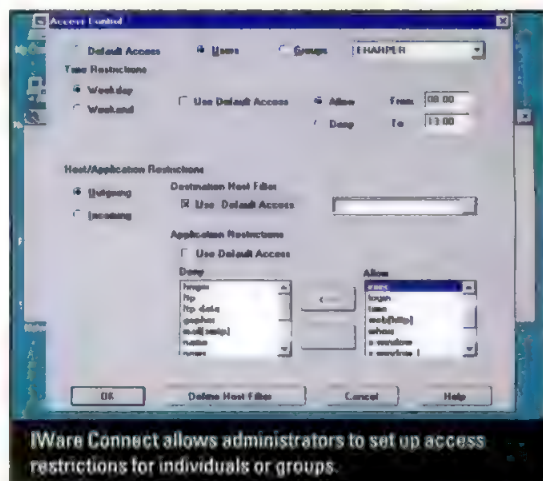
Turnkey solutions aren't the only IPX-to-IP gateway options available. You may want to consider a software-only solution. The two we examine in this roundup are IWare Connect from Quarterdeck Corp. and Nov*ix for Internet from Firefox Communications (a subsidiary of FTP Software).

Both products run as NetWare Loadable Modules (NLMs), but each has its own style of getting the job done. Though Nov*ix has some powerful features, the less expensive IWare is the better choice for users seeking a simple, easy-to-use gateway.

With these software-based gateways, you'll need to purchase the additional hardware necessary to connect to the Internet. Some users will prefer the flexibility of a software solution so they can make separate hardware buying decisions. You'll also want to consider a software-based solution if you need an IPX-to-IP gateway only for an internal network. On our Ethernet File Transfer test, IWare Connect and Nov*ix were about 30 percent faster than Instant Internet.

Several other IPX-to-IP gateways are available for different platforms. Cisco Systems—whose IPeXchange 1004 router we review in the main roundup—also sells software-only versions of IPeXchange for NetWare

The Software Side of



IWare Connect allows administrators to set up access restrictions for individuals or groups.

and Windows NT. SphereLink Communications provides an NLM solution called Internet Runway. Novell will include an IPX-to-IP gateway as part of its IntranetWare bundle that integrates with Novell Directory Services (NDS) for management and security.

Similarly, Microsoft is building an IPX-to-IP gateway into its Windows NT-based Proxy Server, code-named Catapult. Other Windows NT solutions include Mobius Computer's Connex, Frontier Technology's CyberJunction, and BateTech's iWay-One. But these solutions will require a Windows NT server on the network, which could be an obstacle for small NetWare-only shops.

IWARE CONNECT

Quarterdeck sells IWare in two bundles. We looked at IWare Connect (\$1,900 street price for 25 users), which includes the IPX-to-IP gateway but

IPX-to-IP Gateways

1004 router comes with a 10Base-T Ethernet port and an ISDN port with an integrated NT-1 (the termination device for an ISDN line). Another model, the IPExchange 1005, provides frame-relay or leased-line connections. Separately, Cisco sells the software-only IPExchange Internet Gateway, which can run under NetWare and Windows NT Server (we tested the NetWare version of IPExchange on

our Ethernet File Transfer test).

The IPExchange client software uses its own Winsock to establish a connection between the client PC and the router. Once the client is connected to the router, all the client's TCP/IP requests are sent to the IPExchange gateway and then out to the Internet. IPExchange works with any 16-bit Winsock 1.1-compliant application. Cisco also sent us a version of its new

32-bit Winsock driver—to be available by the time you read this—which let us use the 32-bit versions of Netscape Navigator and Microsoft Internet Explorer.

IPExchange did not perform well on our tests. On our ISDN File Transfer test, the IPExchange's Multilink PPP feature was unable to maintain a full 128-Kbps connection with our ISP; instead it used just one of the ISDN line's two B-channels.

IPX-to-IP Gateways

without any bundled client applications. IWare InternetSuite (\$2,480 street price for 25 users) includes the IPX-to-IP gateway along with Internet software, including a Web browser and e-mail, newsgroup, FTP, and telnet clients.

Installing IWare Connect took only about 5 minutes and was very straightforward. The product runs on NetWare 3.x or 4.x and uses the NetWare/IP NLM as its TCP/IP stack. The security options allow you to restrict user access as well as site access. IWare includes tools to track where users on the network are spending their Internet time. IWare Connect, like Nov*ix, can only run 16-bit client TCP/IP applications. We were able to install IWare Connect on a Windows 95 client and get it to work successfully. The company is developing a 32-bit version that works with Windows 95 (but not Windows NT); the beta software is available at Quarterdeck's Web site.

A feature of IWare Connect that we appreciated was the ability to switch easily between the product's Winsock and another TCP/IP stack. This capability is valuable for those who use TCP/IP at their workstations for applications on an internal network but want to access the Internet through the IWare IPX gateway.

IWare Connect doesn't care what kind of connection you have to the Internet. It could be an Ethernet, ISDN, T1, or asynchronous connection; all you need to provide is an internal or external router to do the work.

IWare Connect. Street price: For 25 users, \$1,900. Quarterdeck Corp., Marina del Rey, CA; 800-225-8148; www.quarterdeck.com. *Circle 459 on reader service card.*

NOV*IX FOR INTERNET

Nov*ix for Internet (\$5,275 list price for 25 users) comes with an IPX-to-IP gateway NLM, plus Internet tools,

including a Web browser and e-mail, news reader, and Gopher clients. Firefox also sells Nov*ix for Client/Server (\$4,025 list price for 25 users), which consists of the IPX-to-IP gateway without the Internet applications. Firefox also plans to ship an IPX-to-IP gateway for Windows NT by the end of this year.

Installation wasn't difficult, but installing Nov*ix took quite a bit longer than installing IWare. Nov*ix has

so many more installation options that it was hard to know what each option does without searching through documentation.

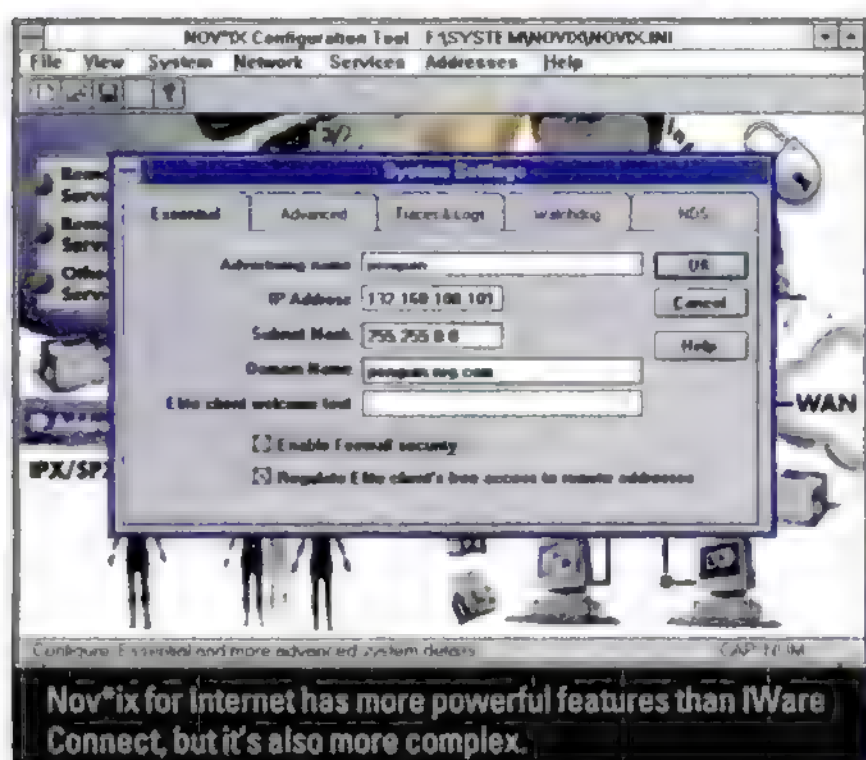
Nov*ix, unlike IWare, uses its own TCP/IP stack on the server instead of Novell's TCP/IP. The Nov*ix TCP/IP can provide multihoming, which lets you create an IP address pool so you can assign IP addresses to clients, which may be useful for complex configurations.

Nov*ix, like IWare, currently supports only 16-bit client software. To get the Nov*ix driver to work with Windows 95 we had to delete the WINSOCK.DLL file in both the main Windows directory and the hidden WINDOWS\SYBCKUP directory. Firefox is also working on a 32-bit implementation of its client software, to be available next year.

Unlike IWare, Nov*ix prompts you for specific information regarding your Internet connection. It lets you configure a modem to dial your Internet connection, and if you have a wide area network connection, you'll be prompted to enter router information. Nov*ix gives you administration and logging tools to keep track of usage and set restrictions on users and sites.

Nov*ix is appropriate for users desiring a somewhat more sophisticated IPX-to-IP solution. But be prepared to spend more time with the product, because extra power brings additional complexity.

Nov*ix for Internet. List price: For 25 users, \$5,275. Firefox Communications Inc., San Jose, CA; 800-230-6090; www.firefox.com. *Circle 460 on reader service card.*



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Choosing an Internet Service Provider for Your Business

By Steve Rigney

As with any service you outsource, your Internet access should meet the specific needs of your business. You have to make sure the Internet service provider offers all of the services you want—and that you can afford them. Most ISPs provide basic service information on their Web pages, which are good places to start when comparing connection types, pricing, services, applications, management, and support.

FAST, FOR A FEE

One of the questions network administrators typically ask about LAN connections to the Internet is how fast a connection they need. The answer is determined by a quick user survey and some guesswork. First, find out how many people need to connect, and what they need to do. For example, if only a few users need to access the Internet to send small e-mail messages, you could probably start with a single 28.8-Kbps modem connection.

On the other hand, although the most popular way to connect employees to the Internet is to equip them with modems, dial-up connections are difficult to manage and can be expensive when you have to install and support a modem and phone line

on every desktop.

Most large ISPs offer connection speeds ranging from an analog connection at 28.8 Kbps to a T1 line (1.544 Mbps) or even faster (see the table below for a comparison of several nationwide ISP's connection types and service plans). With 8 or 10 active Web users, you might need at least one 56-Kbps leased line. The turnkey IPX-to-IP gateways we review in the main roundup require an ISDN line, which provides a 128-Kbps connection. These devices are aimed at small LANs of 20 to 50 users. If you have hundreds of users, you'll probably need a T1 connection. If your network is somewhere in between, you can use several 56-Kbps or ISDN lines to aggregate bandwidth.

Flexibility and scalability are important attributes for an ISP. For example, you might want to start with a single 56-Kbps connection and then add bandwidth as your needs increase. If the ISP cannot scale service to meet your needs, you will have to change providers, which can be costly and disruptive. If you have thousands of potential users, consider a large ISP such as BBN, MCI, Sprint, or UUNet Technologies. These providers own their own *backbones*—very fast wide-area networks—and can provide you with as much bandwidth as

you need. But if you count your users in the hundreds, local providers, of which there are more than 3,000 in the U.S., can offer greater flexibility.

Pricing varies widely. A large-backbone ISP may offer better reliability and redundancy so you'll never worry about getting a busy line or losing your connection, but its rates will reflect that level of service. Larger ISPs also offer faster connections, but these cost more. For example, a dedicated 56-Kbps connection will cost about \$500 a month, while a T1 connection will cost over \$1,000 a month. You also have to pay for the routers that establish the connections; however, you can usually rent these from the ISP or from the telephone company providing the line to your office.

BEYOND THE BASICS

While most people use the Internet just to send e-mail and access the Web, those are just two of the many services and applications an ISP can provide. An ISP will often handle domain name registration for your company, so your e-mail can be addressed to *yourcompany.com* instead of the ISP's domain name, and customers can access your Web site directly instead of having to pass through the ISP's home page.

For a fee, you should be able to publish your Web pages and files on a

SUMMARY OF FEATURES

National Business Internet Service Providers

■ YES □ NO Services listed in alphabetical order	ANS CO+RE Systems	AT&T Corp.	BBN Corp.	IBM Global Network	MCI Communi- cations Corp.	PSINet	Sprint	UUNet Technologies
Web address	www.ans.net	www.att.com	www.bbn.com	www.ibm.com	www.mci.com	www.psi.net	www.sprint.com	www.uu.net
Telephone number	800-456-8267	800-967-5363	800-472-4565	800-455-5056	800-955-6505	800-827-7482	800-910-2418	800-488-6383
Connection types								
28.8-Kbps analog modem/ISDN	■ □	■ □	■ ■	■ □	■ □	■ ■	■ □	■ ■
Frame-relay/Leased-line	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Switched 56/T1/T3	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Firewall services	■	■	■	■	■	■	■	■
Domain registration	■	■	■	■	■	■	■	■
Web-site hosting	■	■	■	■	■	■	■	■
On-site hardware option	■	■	■	■	■	■	■	■
On-site service option	■	■	■	■	■	■	■	■
24-hour technical support	■	■	■	■	■	■	■	■

IPX-to-IP Gateways

shared server hosted and maintained by your ISP. Some ISPs require you to set up Web servers at your location, but maintaining an active Web site might not be something you want on your plate. Some providers and consulting companies even offer Web site design services.

Other important services that an ISP should offer include firewalls for security and a virtual private network (VPN). A firewall, such as BBN's \$30,000-a-year Site Patrol service, will protect your data from intruders. BBN will also monitor the firewall 24 hours a day to ensure no one gets through. A VPN lets you use the ISP's network as your wide-area network. Your traffic will probably move across the same wires as other Internet traffic, but the ISP's routers will handle it differently and won't expose it to anyone outside the VPN. A VPN can be less expensive than paying for dedicated lines that connect your branch offices. It's a good idea to ask if your ISP can provide a committed information rate (CIR) to guarantee your minimum throughput.

If you're going to pay a lot of money every month to connect your business to the Internet, you'll want to be able to manage your connections and keep track of usage. A good ISP can provide you with round-the-clock management of your hardware and connections, as well as statistics on usage. These reports will help you determine if you have enough bandwidth and whether some users are surfing the Internet more than they should.

Many small local ISPs are only open during the week and don't provide technical support after hours. If you work late or your business never closes, make sure that you have

The IPeXchange also finished behind Instant Internet on our Ethernet File Transfer test.

Configuring the IPeXchange 1004 is not for the novice. Although the gateway hardware will auto-configure it-

SUITABILITY TO TASK	
Cisco IPeXchange 1004	
Setup and installation	Fair
Administration and management	Fair

self to operate over the LAN, it takes several minutes. Unlike the two other products reviewed here, Cisco does not offer a Windows-based configuration utility. Instead, it uses an HTML-based tool called ClickStart to access and configure the unit. The benefit of the browser-based configuration tool is that you can use virtually any platform to configure IPeXchange.

The ClickStart menu, however, doesn't let you access all of the gateway's features. Though you can enter most of the information necessary to operate the gateway via ClickStart, many options are not available, including Multilink PPP parameters and the router's PAP and CHAP authentication settings.

To configure these settings, you must access the IPeXchange 1004 using either a terminal session through a serial cable linked directly to the unit or a telnet session over the LAN. We had to use the terminal session to check the gateway's configuration. Similar to the other products reviewed here, the IPeXchange 1004 includes a test feature to check the connection to your ISP. Currently, however, IPeXchange does not offer any administrative or logging features; both Instant Internet and WebRamp include such features.

After we had configured and tested the gateway, we installed the IPeXchange client software without a hitch. The instal-



Cisco IPeXchange 1004 includes Web-browser configuration, but to access some settings you must use telnet over the LAN or a terminal session through the unit's serial port.

Performance Technology Inc.

Instant Internet



Instant Internet from Performance Technology, a Bay Networks company, stands apart from the other IPX-to-IP gateways we reviewed with its "just add water" approach to Internet connectivity. Instant Internet (\$2,895 for the ISDN and 10Base-T model with 20 users) earned our Editors' Choice for its easy installation, superior management features, and good performance.

Instant Internet is a small-footprint computer with a Cyrix 486/80 processor; it is available with a built-in 28.8-Kbps modem or ISDN terminal adapter, and your choice of one of several Ethernet and Token-Ring LAN adapters. Alternatively, Instant Internet is available with two Ethernet or Token-Ring adapters, one for connecting the LAN and one for connecting to a higher-speed line, such as a dedicated T1 line.

On our ISDN File Transfer test, Instant Internet delivered results that matched those of WebRamp. Instant In-

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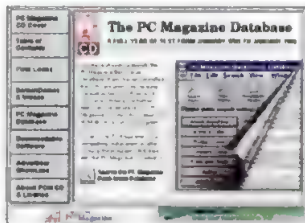
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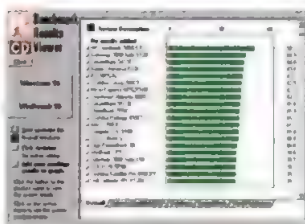
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TCP/IP on the LAN: Going Native

By Steve Rigney

The alternative to using an IPX-to-IP gateway for connecting your IPX network to the Internet is installing TCP/IP on every one of your client PCs. But even small LANs with only a dozen clients are not immune to the many problems associated with installing and maintaining IP on the LAN.

To be sure, installing and managing an IPX-to-IP gateway can be complex. And tools are available that make TCP/IP addressing easier. But putting TCP/IP on the LAN introduces a new

If your network is connected to the Internet, the TCP/IP addresses you use must be unique. An Internet service provider will normally provide all of your IP address, gateway, and subnet mask information. If you bypass the ISP, to obtain legal IP addressing information you will have to contact the InterNIC (*rs.internic.net*), which administers network IP addresses and registers Internet domain names.

Getting the right addresses is complicated, but that's just the first step. You also have to install TCP/IP on all of your network clients. Because most

solutions, which perform some firewall-like functions.

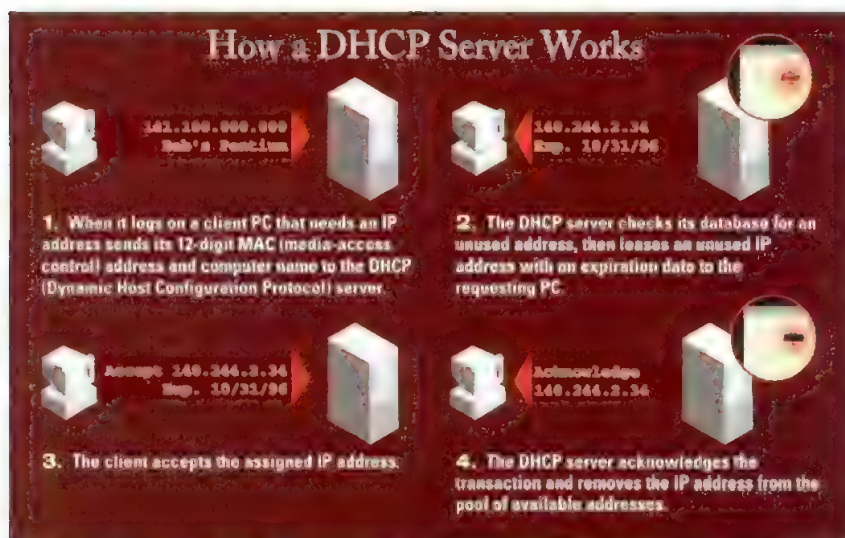
SOME SOLUTIONS

If you do need to install and maintain TCP/IP on your network PCs, there are some utilities to help you. The most common utility for keeping track of your IP addresses is called a *DNS* (Domain Name Service) server. DNS operates as a server-based host table that keeps track of all of the IP addresses on your network and associates the numeric IP addresses with character-based names. Unfortunately, the address table on the DNS server is not dynamic; you must change it any time you want to add a new address or change an existing one.

DHCP (Dynamic Host Configuration Protocol) takes DNS one step further and allows you to assign an IP address to a new client PC automatically, as it connects to the network (see diagram). The network PC runs a piece of software called the DHCP client, which connects to the DHCP server to request an IP address. The DHCP server looks in its database for the client's *media-access control* (MAC) address and name. If the client doesn't show up in the database, the server leases it a new IP address with an expiration date. The client then accepts the terms from the DHCP server, and it's up and running as a TCP/IP client.

Network operating systems now include DHCP as part of their core services: Microsoft's Windows NT Server, IBM's OS/2 Warp Server and Novell's TCP/IP NLM for NetWare each have DHCP features.

One shortcoming of DHCP is that each time a client logs on, it usually receives a different IP address. Microsoft extends DHCP with *WINS*, the Windows Internet Naming Service. WINS associates your computer name with the temporary IP address assigned by the DHCP server, so that your PC can be located by its name.



set of problems: You have to know how to obtain proper IP addresses, which drivers and TCP/IP stack to use, and how to manage it all.

THE TCP/IP PROBLEM

Every network client running TCP/IP needs specific information to identify itself, its local network, and the destination of network packets headed for computers outside the LAN. This information is the *IP address* (your identifier on a TCP/IP network), *subnet mask* (which indicates the part of the network, or subnet, where you're located), and *default gateway* (the computer or device that routes information from the local network to an external network, such as the Internet).

networks are heterogeneous, this may require working with different OSs and platforms, such as DOS, OS/2, Macintosh, and Windows. Multiple protocols also use more RAM on each client PC, an issue especially if you are running DOS or Windows 3.x.

Security also becomes a primary concern when you install TCP/IP on all of your servers and client PCs and connect them to the Internet: You're essentially opening up your network to the rest of the world. Anyone who knows your IP address has the ability to see your server, and if your security is weak, someone could potentially steal or corrupt some of your network data. Security is one reason to look at IPX-to-IP gateway

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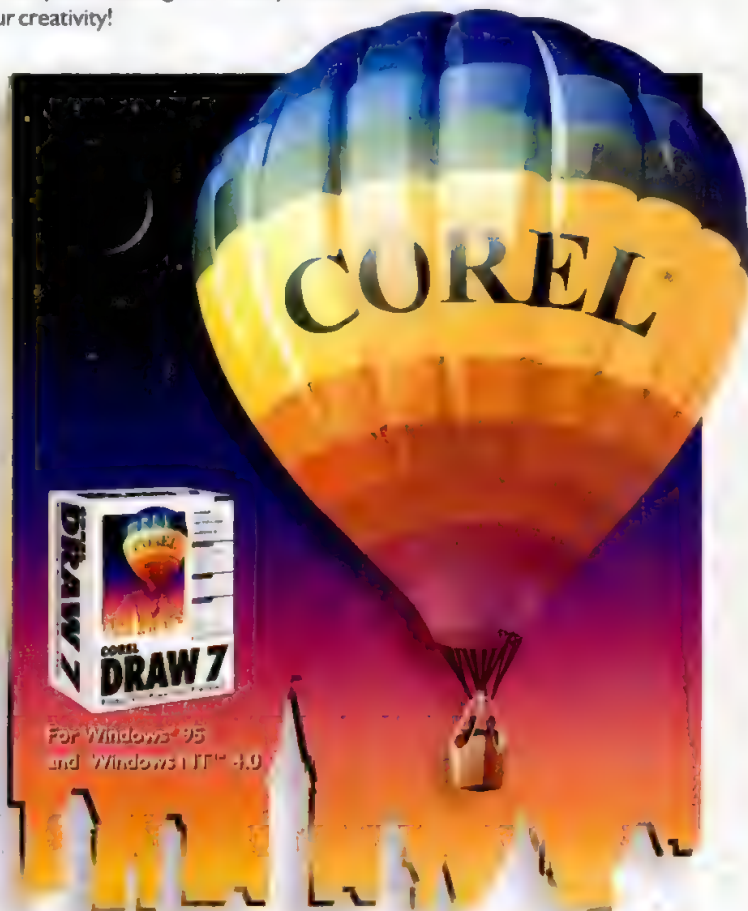
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active line, and fire it up. You configure Instant Internet over the LAN with a Windows program that lets you enter the gateway name and information necessary to connect to your local Internet service provider (ISP). For those who don't have an ISP, Instant Internet provides a pick list of several hundred ISPs with contact information and a connection script for each. If your provider is not on the list, you can contact Performance Technology, which will write a connection script for you. A diagnostic feature allows you to test the connection's condition.

Once you have configured the gateway and tested the connection, you need to install the client software. Depending on a client's existing configuration, the installation routine adds or replaces the Winsock and installs a complete set of Internet applications: cuteFTP, Eudora e-mail, the Win VN news reader, and the WinWeb browser. You aren't limited to just these Internet applications, however; any 16-bit or 32-bit Winsock-compliant application will work just fine. We installed the Microsoft Internet Explorer and Netscape Navigator browsers without any problems at all.

In addition to quick and easy Internet access, Instant Internet gives administrators extensive control over access, based on users and groups. Unlike the other products we reviewed, Instant Internet dynamically draws the existing user and group information from the NetWare Bindery or the Novell Directory Service (NDS). Administrators of peer-to-peer environments must set up users and groups manually.

The network manager can limit a user's



Instant Internet is a breeze to set up: Just plug the gateway into a LAN connection, connect the ISDN adapter to an active line, and turn it on.

SUMMARY OF FEATURES

IPX-to-IP Gateways



	HARDWARE/SOFTWARE			SOFTWARE	
	Cisco IP- eXchange 1004	Instant Internet	WebRamp IPX Gateway	iWare Connect	Nov*ix for Internet
■ YES ■ NO □ OPTIONAL In alphabetical order by category					
Price	\$2,495 list (20 users)	\$2,895 list (20 users)	\$1,499 list (20 users)	\$1,900 street (25 users)	\$5,275 list (25 users)
Application-level gateway filters	■	■	■	■	■
Supports 16-bit/32-bit Winsock applications	■ ■	■ ■	■ ■	■ ■	■ ■
Packet-filtering	■	■	■	■	■
Supports SAP	■	■	■	■	■
Hardware Specifications					
Ethernet/Token-Ring	■ ■	■ ■	■ ■	N/A	N/A
Connection types:					
28.8-Kbps analog modem	■	■	■	N/A	N/A
Basic-rate ISDN	■	■	■	N/A	N/A
Primary-rate ISDN	□	■	■	N/A	N/A
T1	□	■	■	N/A	N/A
Dimensions (HWD, in inches)	1.5 x 8.0 x 8.3	3.5 x 13.5 x 13.7	1.5 x 9.6 x 6.4	N/A	N/A
Fixed/dynamic IP address	■ ■	■ ■	■ ■	N/A	N/A
Supports Multilink PPP	■	■	■	N/A	N/A
Access Control and Security					
Access controlled by:					
Users/Groups	■ ■	■ ■	■ ■	■ ■	■ ■
IP address/Port number	■ ■	■ ■	■ ■	■ ■	■ ■
Time/Date/Day	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Supports PAP/CHAP	■ ■	■ ■	■ ■	■ ■	■ ■
IP spoof detection	■	■	■	■	■
Management					
Windows-based management tools	■	■	■	■	■
HTML-based management tools	■	■	■	■	■
Supports SNMP	■	■	■	■	■
Monitors users	■	■	■	■	■
Monitors performance statistics	■	■	■	■	■
Can assign multiple IP addresses	■	■	■	■	■
N/A—Not applicable: The product does not have a hardware component.					

access through the gateway based on date, time, and TCP/IP port number, as well as block access to specific newsgroups or Web sites. Other features include reporting on Internet activity—usage statistics and connect time for each user—as well as support for SNMP (Simple Network Management Protocol). You can even track which sites users have visited—but you should let them know that Big Brother is watching.

Instant Internet's appealing combination of ease of use, use-

ful management features, and strong performance make it one of the best solutions for connecting your IPX-based LAN to the Internet.

Instant Internet 3.1. List price: ISDN and 10Base-T model for 20 users, \$2,895. Performance Technology Inc., San Antonio; 800-327-8526; www.perftech.com. Circle 457 on reader service card.

Trancell Systems Inc.

WebRamp IPX Gateway

WebRamp IPX Gateway is a low-cost, turnkey solution for connecting Windows clients to the Internet. Taking a slightly different approach than the other two turnkey products reviewed here, WebRamp combines three technologies—an IPX-to-IP gateway, an

SUITABILITY TO TASK

Instant Internet

Setup and installation	Excellent
Administration and management	Excellent

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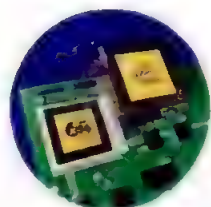
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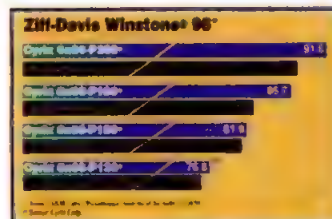


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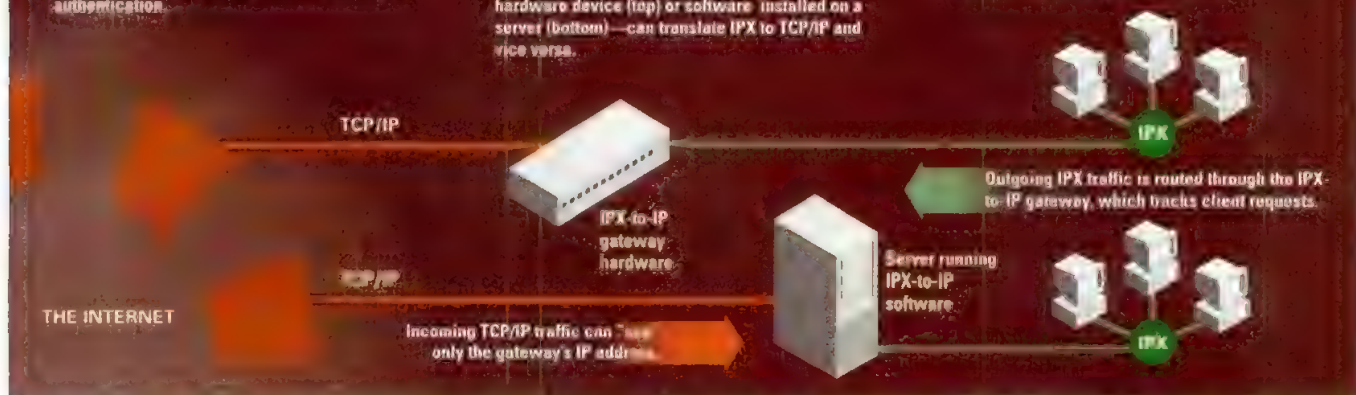
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IPX-to-IP Gateways: Added Security

The Internet speaks TCP/IP, a protocol that is efficient for transmitting data across wide-area links. Today TCP/IP has no inherent security or authentication.

IPX is the network protocol used by Novell's NetWare and other operating systems. An IPX-to-IP gateway—in the form of either a dedicated hardware device (top) or software installed on a server (bottom)—can translate IPX to TCP/IP and vice versa.

Because the PCs on the IPX network do not have TCP/IP addresses, no one can even attempt to access them directly from the Internet.



ISDN interface, and an eight-port 10Base-T hub—into one easy-to-use unit. At a list price of \$1,499, WebRamp is sure to be a winner for small offices on tight budgets. If you administer a large shop, however, you should be aware that WebRamp lacks the scalability options and some of the administrative tools and features (such as the ability to read the NetWare Bindery or Novell Directory Services database) that administrators of larger networks often want.

The WebRamp gateway is a small 10Base-T hub—no bigger than a hard-cover book—that houses a built-in ISDN terminal adapter and IPX-to-IP routing software. You can plug up to 8 PCs running Ethernet into the unit or connect WebRamp to an existing Ethernet LAN to support as many as 50 Windows clients running IPX.

WebRamp demonstrated good performance—about the same as Instant Internet's—on our ISDN File Transfer test. On our Ethernet File Transfer test, however, WebRamp delivered less than one-third the throughput of Instant Internet. If you need an IPX-to-IP gateway for your internal network, WebRamp is not your best option.

WebRamp is easy to install and configure. A Windows-based utility called WebRamp Wiz lets you configure the Web-

Ramp unit across the LAN. WebRamp Wiz walks you through setting up the unit for communications with your local ISP. A pick list of ISPs offering ISDN support is available to get you started, but the contact information provided consists only of telephone numbers; unlike Instant Internet, WebRamp includes no scripts to help you get connected. You may opt to fax a blank information sheet to the service provider, which can then fill in the appropriate information; simply enter the information provided by the ISP, and away you

go. A diagnostic test is available to check the gateway's operations and ISDN line.

SUITABILITY TO TASK	
WebRamp	
Setup and installation	Good
Administration and management	Fair



Once you have configured the WebRamp unit, client installation is a snap. Like the other products reviewed, WebRamp uses a modified Winsock 1.1-compliant WINSOCK.DLL on the client. This allows any 16-bit Winsock application to access the Internet transparently through the WebRamp gateway and the ISDN connection. WebRamp ships with licensed copies of the two top Web browsers on the market today—Microsoft Internet Explorer and Netscape Navigator—as well as the Eudora Lite e-mail client. WebRamp also includes a 32-bit client for use with Microsoft Windows 95 or Windows NT Workstation.

When it comes to administrative tools, WebRamp falls a bit short. Unlike Instant Internet, WebRamp does not allow the network manager to control access through the gateway on a user or group basis. Moreover, the only logging available tracks the user's activity based on a network address and the total connect time, not based on the user's name.

WebRamp does offer a line-monitoring option that dynamically reports on the status and transmission rate of the ISDN line, incoming and outgoing traffic, and the number of simultaneous connections. Instant Internet offers a similar monitoring feature, but Cisco IPEXchange does not. □

WebRamp IPX Gateway. List price: For 20 users, \$1,499. Trancell Systems Inc., Santa Clara, CA; 408-988-6363; www.trancell.com. Circle 458 on reader service card.

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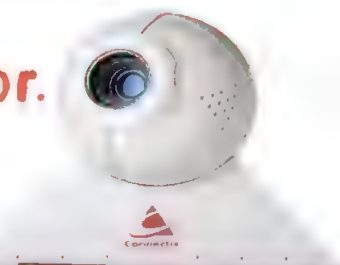
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Cascading Style Sheets

Style sheets offer creative control over documents—without sacrificing device independence.

By Neil Randall

The great thing about basic HTML is that it's easy to learn. Grab a couple of heading tags—`<H1></H1>` and `<H3></H3>`, for instance—plus tags for a bulleted list—`<UL><LI></LI></UL>`—and a hypertext link—`<A HREF...></A>`—and you've got yourself a respectable little design. Start digging into the more complex codes, such as those for images, tables, forms, and the like, and before long, you have a Web page that's ready for prime time. At some point, however, the realization will dawn that, as a page design tool per se, HTML suffers severe limitations.

HTML was never intended for page design. From the beginning—way back at CERN, in 1989—the goal was a coding system that enabled the easy exchange of information in a format independent of operating systems and hardware platforms, and that allowed authors to point to related documents easily and effectively. Thus, HTML offered just a limited set of page design elements—headings, lists, graphics, and some rudimentary typographic features, such as boldface and italics—plus an immediately popular means of producing hyperlinks. But then a funny thing happened:

The NCSA Mosaic browser appeared. Its ability to show spiffy graphics pumped life into the aesthetically dull Internet, and the clamor for Web pages resembling print magazine pages began. Then, in 1994, along came the Netscape browser, audaciously offering several nonstandard text design features that displayed only in that browser.

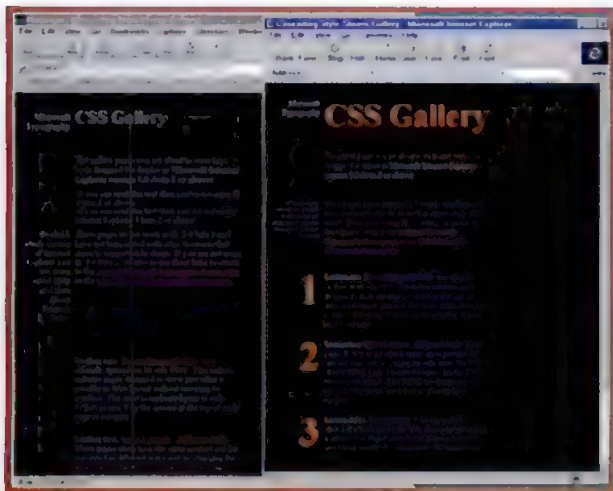


FIGURE 1: Microsoft's CSS gallery shows you just how effective style sheets can be.

IN THIS SECTION



TUTOR TCP/IP is the set of protocols that makes the Internet possible, but what exactly is it? Jeff Prorise provides an introduction to several of these protocols and explains how they all fit together in a layered system that ranges from the physical wires up to the application level. *Page 223.*



POWER PROGRAMMING A lot of Win32 programmers have run into a wall when it comes to List-View controls: How do you get the rows of the list to appear just as you want them to? Learn how, by using owner-drawn controls, you can do this, plus make the list sortable. *Page 229.*



UTILITIES This time we offer a Backgammon game so that you can hone your skills, using your computer as an opponent in this ancient and fascinating game. Michael J. Mefford has studied the strategy of the game to produce a Delphi application that lets you play against another human or the computer. *Page 237.*

ALSO IN THIS ISSUE In PC Solutions, we tell you how you can set up multiple configurations in OS/2, reveal an easy way to use functions in Word for Windows, tell you how to create custom numeric formats in Excel, explain how to set the Paradox Runtime Refresh, and more. *Page 247.*

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Despite the outcry from those who believed—correctly, in fact—that these non-standard features went against the Web principle of universal display, Web authors started using these features to produce better-looking pages. Netscape kept upping the ante with new versions of Navigator, and before long, Microsoft chimed in with similar gadgets in Internet Explorer. The point of all this activity was to give Web authors a means of designing Web pages that approached the controlled design of magazine pages. (Many argue that this goal has curtailed the growth of the Web as a separate communications medium). A number of these new codes have found their way into the new HTML 3.2 standard, so the presentation school has won the first round.

Although the new codes do offer extended design flexibility, they create other problems. First, new HTML tags issued by browser vendors threaten the principle of compatibility across browsers. Second, it's one thing to laboriously place all these codes into a single Web page; it's quite another to use them consistently across a large Web site. As a site designer, you want a coherent presentation, but you don't want to keep rekeying all those codes into every document throughout the site. What you need is a means of telling the user's Web browser to treat identical elements consistently throughout your site, so that all Level 2 headings, say, in all documents are the same size and color. In other words, you need a way to say to the browser, "I want all my documents to look like *this*"—just as you would be able to do with a desktop publishing program or, using templates, a word processor. You want to keep control of your documents out of the user's hands and in your own much more creative ones.

Enter style sheets. Two proposals for the implementation of style sheets in HTML and SGML are currently in the works. The version sanctioned by the International Organization for Standardization (ISO) is called Document Style Semantics and Specification Language, better known as DSSSL (occam.sjf.novell.com:8080/dsssl/dsssl96/). A different style language, however, appears to be further along, and is aimed specifically at HTML: Cascading Style Sheets, or CSS, is the set of commands proposed by the W3 Consortium (www.w3.org/) to solve the dual problems of proprietary HTML codes and unified Web page design. We'll take a look at CSS Level 1 (CSS1), which Microsoft endorsed earlier this year. Internet Explorer 3.0 contains support for CSS, and Microsoft has created a CSS gallery (see Figure 1) to demonstrate how it works (www.microsoft.com/truetype/). Support from Netscape is expected later this year, with the release of Navigator 4.0.

STYLE VS. STRUCTURE

Style sheets work primarily by separating style from structure. Although style rules can be built into current HTML documents, they

would ideally be incorporated into an entirely separate HTML document—a style sheet. Either way, the idea is to remove the style of an HTML structural element from the element itself, thus avoiding the problem of browsers being unable to interpret and display altered elements. Font faces, background colors, line heights, and text decorations are only some of the styles that CSS proposes to control, not only making it easier for document designers to author consistent documents but allowing a user's browser to display them consistently as well. Moreover, in the future, the CSS spec will benefit more than just browsers. As Web documents move to incorporate new technologies—such as audio players for the visually impaired—style sheets will help ensure that the structure and the content of the documents are not affected. For this reason, incidentally, the CSS1 proposal refers to user agents (UAs) rather than to browsers, since at some point browsers might not be the affected technology.

MORE CONTROL

Style sheets allow you to control many layout and typographic functions. These include body backgrounds (colors or graphics files), heading colors, link and visited-link colors, the appearance of first lines and first letters, margin sizes, word and letter spacing, and font colors, weights, and families. At the very least, you can specify that, say, the font color for your Level 2 headings will be blue, that they will be boldface, and that they will use the Arial typeface. Of course, you can already do these things, but what CSS lets you do is specify these layout choices at the top of your HTML document so that all identical elements within the document—Level 2 headings, in this case—will assume those stylistic attributes. Not only that, but you can copy the entire style definition from HTML document to HTML document, eliminating the need to specify all those attributes again and again throughout a Web site. In fact, CSS goes even further, letting you simply point to a document that contains the styles you want: All of the documents pointing to the one containing your original style choices will automatically follow those same style definitions.

Styles can be included in HTML documents in four ways: First, they can be coded directly into the <BODY> of the document, using the attribute STYLE combined with a given HTML tag or container. The paragraph tag <P>, for example, can use <P STYLE= > to make the entire paragraph assume a specific color or typeface, give it specific margins, and so forth. Though useful, this capability actually defeats the purpose of style sheets—to keep structural elements (here, <P>) separate from style choices. More effective, therefore, is the inclusion of the <STYLE></STYLE> container inside the <HEAD></HEAD> container. With-

in this container, you can specify all the style choices you want your HTML elements to assume. You can't specify a single red paragraph, but you can make all of your visited links, for example, green, boldface, 18-point Helvetica. If you already have a style sheet whose attributes you wish to copy, you can import that document into the current document by using the @import notation (specifying either a URL or a local filename) inside the STYLE container. Finally, if you'd rather not import a style sheet but still want your current document to assume the elements of an existing style sheet, you can use the LINK element plus the anchor element <A> to link the current document to an existing page whose style sheet you want used.

BUILDING STYLES

Constructing styles is simply a matter of specifying which style features you want to give to which HTML elements. For example, to make all of your Level 2 headings red, you'd include the rule H2 {color: red}. Here, H2 is known as the *selector* and color: red as the *declaration*. Inside the declaration, color is the *property* and red is the *value*. The rule itself is placed inside the STYLE container within the HEAD container, so that the HTML code (stripped of any elements extraneous to this example) would look like the following:

```
<HTML>
<HEAD>
<STYLE TYPE="text/css">
H2 {color: red}
</STYLE>
</HEAD>
</HTML>
```

(The TYPE attribute for the STYLE element tells the browser you're using the CSS MIME type; if you were using DSSSL, it would read TYPE=application/DSSSL).

We've now constructed a style sheet, though hardly an elaborate one. Giving an HTML element a single style attribute is just fine, but by combining several style sheets, you can gain considerable control over your documents. You can use style sheets to combine attributes to create a precise style. The following code, for example, gives all Level 3 heading elements a combination of properties:

```
<HTML>
<HEAD>
<STYLE TYPE="text/css">
H3 { font-size: 125%;
font-weight: bold;
color: green;
font-family: Arial, Helvetica,
sans-serif, Times;
margin-left: 15%;
margin-right: 25%}
</STYLE></HEAD></HTML>
```

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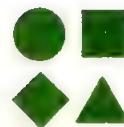
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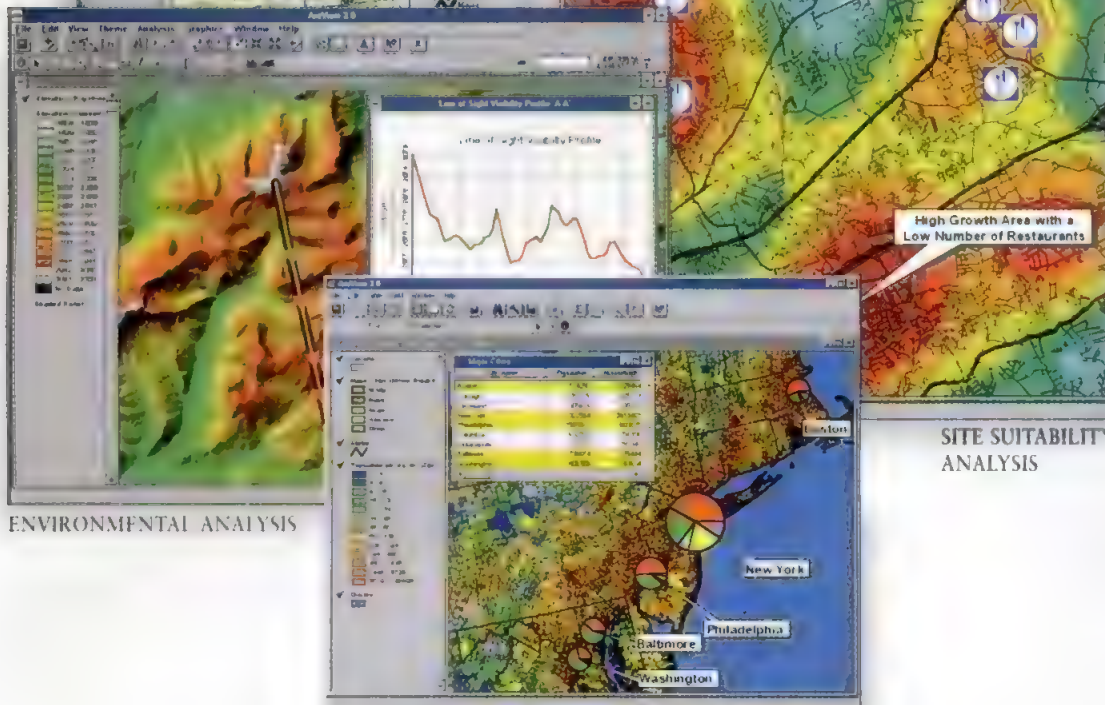
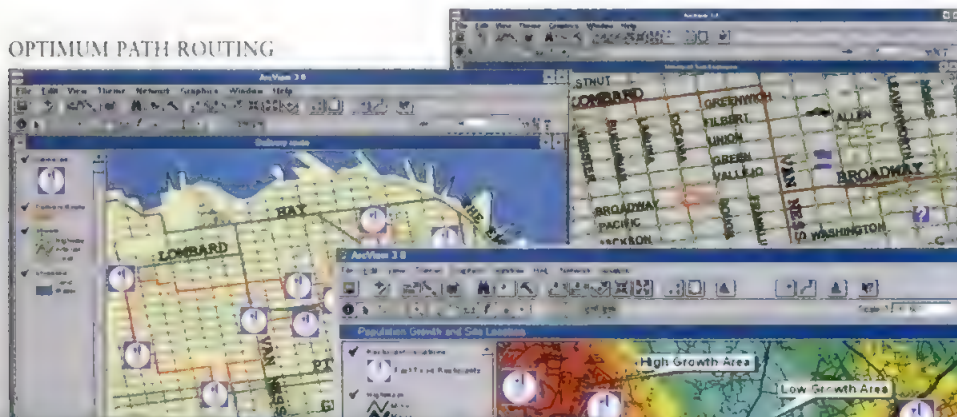
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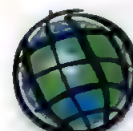
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Here, we're telling the user's browser to display all Level 3 headings in a green, boldface font; preferably in the Arial typeface, but if that's not available, Helvetica, sans serif, or, as a last resort, Times; and to indent the heading 15 percent from the left and 25 percent from the right. All Level 3 heads will take on these stylistic traits, letting you concentrate on the content of the document rather than on individual element designs. Note that the entire style description is surrounded by braces, and that each specific element ends with a semicolon.

You can also build style *classes*, or specially created elements, to gain even more control. Classes are built inside the STYLE container within the HEAD element, with the name prefaced by a dot. Later in your HTML code, you can reference that class as an attribute, via a structural tag. For example, let's say you have two different types of paragraphs, the first (which we'll call p1) with indented right and left margins and black text, and the second (p2) with unindented margins and red boldface text. You can establish each paragraph as a class, as follows:

```
<STYLE>
.p1 {color: black; margin-left: 15%;
margin-right: 30%}
.p2 {color: red; font-weight: bold}
</STYLE>
```

Later, you can use these classes by including them with the paragraph tag:

```
<P CLASS=p1> This is the first
paragraph.
<P CLASS=p2> This is the second
paragraph.
```

You can reuse these classes over and over again, and you can import them as part of a stylesheet into other documents as well.

At this point, you might well be saying that you can already make your text look the way you want by using graphics to represent stylized text. True, but you can't always guarantee that the user will have the graphics option toggled on, or that the user will even have a graphics-capable browser. With style sheets, you're using standard HTML, so the text will display even if graphics are turned off or, as in the case of a text browser like Unix's Lynx, even if no graphics are possible at all. Perhaps even more importantly, graphics load more slowly than HTML code, even gussied-up HTML code, and each graphic requires a separate HTTP connection to download as well. Style sheets speed up user access while letting you control the look of your documents.

There's a great deal more to style sheets than what we've covered in this article, from

floating elements, canvases, vertical and horizontal formatting, to—oh, yes—cascading itself, which, by the way, refers to the order in which conflicting style rules are resolved. This is important because more than one style sheet can be in effect simultaneously (both authors and readers can specify styles). Generally, the last instance of duplicate rules is the one that takes precedence, though authors can specify importance and order.

You can find the latest specification at www.w3.org/pub/WWW/TR/WD-css1; there, you'll find all of the possibilities—both implemented and under consideration—of CSS1. Be sure to visit Microsoft's CSS gallery, and while you're there, do two things: First, view the HTML code and see how style sheets operate. Second, examine the gallery using both Internet Explorer 3.0 and a browser that doesn't support CSS (Internet Explorer 1.0 or Netscape Navigator 2.0, for example), and find out for yourself just how effective this feature can be. □

Neil Randall has authored and coauthored several books about the Internet, including Using Microsoft FrontPage, Special Edition, the recent Guide to Netscape Navigator Gold, and the upcoming The Soul of the Internet. He can be reached at nrandall@mariner.uwaterloo.ca.

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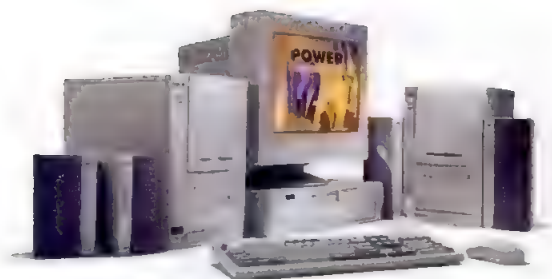
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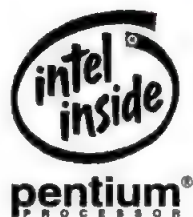
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By Jeff Prosis

A Beginner's Guide to TCP/IP

The protocols that make intranets—and the Internet—work.

Most of us know of TCP/IP as the glue that binds the Internet. But not as many can offer a cogent description of what it is and how it works. So what is TCP/IP, really?

TCP/IP is a means for networked computers to communicate with each other. It doesn't matter whether they are part of the same network or are attached to separate networks. It doesn't matter if one computer is a Cray and the other a Macintosh. TCP/IP is a platform-independent standard that bridges the gap between dissimilar computers, operating systems, and networks. It's the protocol that drives the global Internet, and it is to the Internet that TCP/IP owes much of its popularity.

Understanding TCP/IP is largely a matter of understanding a collection of arcane protocols that TCP/IP hosts use to exchange information. Let's look at some of those protocols and see what makes TCP/IP tick.

TCP/IP BASICS

TCP/IP stands for Transmission Control Protocol/Internet Protocol. In networking terms, a protocol is an agreed-upon standard that permits two computers to exchange data. TCP/IP isn't just one protocol, but several. That's why you'll often hear it referred to as a *protocol suite*, of which TCP and IP are the two principal protocols.

The TCP/IP software that you install on a computer provides platform-specific implementations of TCP, IP, and other members of the TCP/IP family. Typically, it also includes high-level application programs, such as FTP (File Transfer Protocol), which permits users to perform network file transfers from the command line.

TCP/IP is an outgrowth of research funded by the U.S. government's Advanced Research Projects Agency (ARPA) in the 1970s. It was developed so that research networks around the world could be joined to form a virtual network known as an internetwork. The original Internet was formed by converting an

existing conglomeration of networks, known as ARPAnet, over to TCP/IP; that Internet would eventually become the backbone of today's Internet.

The reason TCP/IP is so important today is that it allows standalone networks to be connected to the Internet or linked together to create private intranets. The networks that comprise an intranet are physically connected by devices called *routers* or *IP routers*. A router is a computer that transfers packets of data from one network to another. On a TCP/IP intranet, information travels in discrete units called *IP packets* or *IP datagrams*. TCP/IP software makes each computer attached to the network a sibling to all the others; in essence, it hides the routers and underlying network architectures and makes everything seem like

two were part of the same physical network.

TCP/IP provides a solution to the problem of how two computers attached to the same intranet but belonging to different physical networks can exchange data. The solution comes in several parts, with each member of the TCP/IP protocol suite filling in one piece of the puzzle. The most fundamental TCP/IP protocol, IP, transmits IP datagrams across an intranet and performs an important function called *routing*—choosing the path that datagrams will follow to get from A to B and using routers to “hop” networks.

TCP is a higher-level protocol that allows applications running on different hosts to exchange data streams. TCP divides data streams into chunks called *TCP segments* and transmits them using IP. In most cases, each TCP segment is sent in a single IP datagram. If necessary, however, TCP will split segments into multiple IP datagrams that are compatible with the physical data frames that carry bits and bytes between hosts on a network. Because IP doesn't guarantee that datagrams will be received in the same order in which they were sent, TCP reassembles TCP segments at the other end to form an uninterrupted data stream. FTP and telnet are two examples of popular TCP/IP applications that rely on TCP.

Another important member of the TCP/IP suite is the User Datagram Protocol (UDP), which is similar to but more primitive than TCP. TCP is a “reliable” protocol because it performs the error-checking and handshaking necessary to verify that data makes it to its destination intact. UDP is an “unreliable” protocol because it doesn't guarantee that datagrams

will arrive in the order in which they were sent or even that they will arrive at all. If reliability is desired, it's up to the application to provide it. Still, UDP has its place in the TCP/IP universe, and a number of applications use it. The SNMP (Simple Network Management Protocol) application provided with most implementations of TCP/IP is one example of a UDP application.

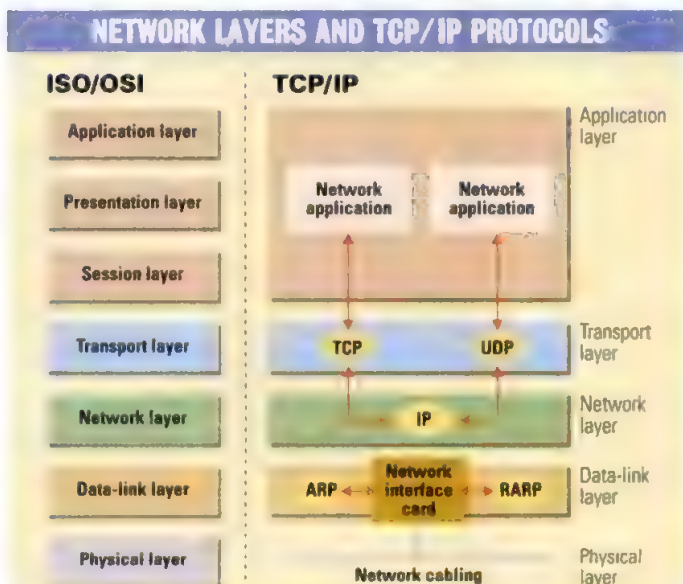


FIGURE 1: The left side of this diagram shows the layers of the ISO/OSI model. The right side illustrates TCP/IP's correlation to the model.

one big network. Just as connections to an Ethernet network are identified by 48-bit Ethernet IDs, connections to an intranet are identified by 32-bit *IP addresses*, which we express as dotted decimal numbers (for example, 128.10.2.3). Given a remote computer's IP address, a computer on an intranet or the Internet can send data to the remote computer as if the

Guide to TCP/IP Protocols and Acronyms

ARP (Address Resolution Protocol): Converts 32-bit IP addresses into physical network addresses—for example, 48-bit Ethernet addresses.

FTP (File Transfer Protocol): Permits files to be transferred from one computer to another using a TCP connection. A related but less common file-transfer protocol, Trivial File Transfer Protocol (TFTP), uses UDP rather than TCP to transfer file data.

ICMP (Internet Control Message Protocol): Allows IP routers to send error and control messages to other IP routers and hosts. ICMP messages travel in the data fields of IP datagrams and are a required part of all IP implementations.

IGMP (Internet Group Management Protocol): Permits IP datagrams to be broadcast, or *multicast*, to computers that belong to multicast groups.

IP (Internet Protocol): A low-level protocol that routes packets of data across separate networks tied together by routers to form the Internet or an intranet. Data travels in packets called *IP datagrams*.

RARP (Reverse Address Resolution Protocol): Converts physical network addresses into IP addresses.

SMTP (Simple Mail Transfer Protocol): Specifies the format of messages that an SMTP client on one computer can use to send electronic mail to an SMTP server on

another computer.

TCP (Transmission Control Protocol): A connection-oriented protocol that transmits data in byte streams. Data is transmitted in packets called *TCP segments*, which contain TCP headers and data. TCP is a “reliable” protocol because it uses checksums to verify data integrity and handshaking to make sure transmitted data is received intact.

UDP (User Datagram Protocol): A connectionless protocol that transmits data in packets called *UDP datagrams*. UDP is an “unreliable” protocol because the sender receives no information indicating whether a datagram was actually received.

Other TCP/IP protocols play less visible but equally important roles in the operation of TCP/IP networks. For example, the Address Resolution Protocol (ARP) translates IP addresses into physical network addresses, such as Ethernet IDs. A related protocol, the Reverse Address Resolution Protocol (RARP), does the opposite, converting physical network addresses into IP addresses. The Internet Control Message Protocol (ICMP) is a support protocol that uses IP to communicate control and error information regarding IP packet transmissions. If a router is unable to forward an IP datagram, for example, it uses ICMP to inform the sender that there's a problem. For a summary of some of the other protocols that fall under the TCP/IP umbrella, see the sidebar above.

TCP/IP ARCHITECTURE

Network designers often use the seven-layer ISO/OSI (International Standards Organization/Open Systems Interconnect) model when discussing network architectures. Each layer in the model corresponds to one level of network functionality. At the bottom sits the physical layer, which represents the physical medium through which data travels—in other words, the network cabling. Above that is the data-link layer, whose services are provided by network interface cards. The uppermost layer is the application layer, where application programs that use network services run.

Figure 1 shows how TCP/IP squares with the ISO/OSI model. It also illustrates TCP/IP's layered design and shows the relationships among the core protocols. As a unit of data flows downward from a network application to the network interface card, it travels through a succession of TCP/IP modules. At each step along the way, it is packaged with information required by the equivalent TCP/IP module on the other end. By the time the data

makes it to the network card, it's a standard Ethernet frame, assuming the network is an Ethernet network. The TCP/IP software on the receiving end recreates the original data for the receiving application by grabbing the Ethernet frame and passing it upward through the TCP/IP stack. (One of the best ways to understand the guts of TCP/IP is to use a “sniffer” program to look inside frames flying around the network for the information added by the various TCP/IP modules.)

To picture what role TCP/IP plays in real-world networks, consider what happens when a Web browser uses HTTP (HyperText Transfer Protocol) to retrieve a page of HTML data from a Web server attached to the Internet. The browser uses a high-level software abstraction called a *socket* to form a virtual connection to a server. To retrieve a Web page, it sends an HTTP GET command to the server by writing the command to the socket. The socket software in turn uses TCP to send the bits and bytes comprising the GET command to the Web server. TCP segments the data and passes the individual segments to the IP module, which transmits the segments in datagrams to the Web server.

If the browser and the server are running on computers connected to different physical networks (as is usually the case), the datagrams go from network to network until they reach the one to which the server is physically connected. Ultimately, the datagrams are delivered to their destination and reassembled so that the Web server, which reads chunks of data by performing reads on its socket, sees a continuous stream of data. To the browser and the server, data written to the socket at one end shows up at the other end, as if by magic. But underneath, all sorts of complex interactions have taken place to create an illusion of seamless data transfer across networks.

And that's what TCP/IP is all about: turning

lots of small networks into one big one and providing the services that applications need to communicate with each other over the resulting Internet.

IN REVIEW

There's much more that could be said about TCP/IP, but here are three key points:

- TCP/IP is a set of protocols that permit physical networks to be joined together to form an internet. TCP/IP combines the individual networks to form a virtual network in which individual hosts are identified not by physical network addresses but by IP addresses.
- TCP/IP uses a multilayered architecture that clearly defines each protocol's responsibilities. TCP and UDP provide high-level data transmission services to network application programs, and both rely on IP to transmit packets of data. IP is responsible for routing the packets to their destination.
- Data moving between two applications running on Internet hosts travels up and down the hosts' TCP/IP stacks. Information added by the TCP/IP modules on the sending end is stripped off by the corresponding TCP/IP modules on the receiving end and used to recreate the original data.

If you're interested in learning more about TCP/IP, let me recommend two further sources of information. The first is RFC (Request for Comment) 1180, a document entitled “A TCP/IP Tutorial” that you can download from any Internet site that disseminates RFCs. The second is the book *Internetworking with TCP/IP, Volume 1: Principles, Protocols, and Architectures*, by Douglas E. Comer (1995, Prentice-Hall). The first in a three-part series, it's considered by many to be the TCP/IP bible. □

Jeff Proise is a contributing editor of PC Magazine.

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PC Tech/Power Programming

By Jeff Prosise

A Better ListView Control

A CListView that draws full-width highlight bars.

When you make your living teaching others how to program Windows, you discover that certain questions come up on a recurring basis. In the old days, it was usually something like, "How do I circumvent the 64K limit on list-box data?" or, "Why do I have to use MakeProcInstance to generate callback addresses?" These and other issues have become moot in the era of 32-bit Windows, but Win32 has its own set of problems and solutions that are the lifeblood of a column like this one.

Lately, the most frequent question in my in-box concerns ListView controls. A ListView control supports four different output styles, or views: large-icon view, small-icon view, list view, and report view. In report view, a ListView control resembles a multicolumn list box with a buttonlike header at the top of each column. Selected items are highlighted in rectangles painted with the system color COLOR_HIGHLIGHT. Curiously, the highlight rectangles don't span the full width of the ListView; instead, they highlight only the text in the leftmost column (see Figure 1). Thus, the question: How do I create a ListView control that highlights entire rows rather than just individual items?

Unfortunately, it's not a matter of creating the control with the proper style bits. If only it were that easy! You'll search in vain for a flag that tells a ListView control to highlight whole rows, because there is no such flag. The trick is to make the ListView an owner-drawn control, so your code can do the painting that indicates which items are selected. With a little work, you can make a ListView paint itself however you'd like.

To demonstrate, I'll present the source code for a document/view MFC application named LVDemo that displays a ListView control in a CListView window. Unlike a standard CListView, this CListView draws full-width highlight bars. In addition to

learning about the mechanics of owner-drawn controls, you'll also see how to make the columns of a ListView sortable. You'll also find out about a documentation bug that affects MFC's CListCtrl::GetColumn function.

Even though the sample code is written

you'd include LVS_OWNERDRAWFIXED in the style bits passed to CreateWindow(Ex). You can also use the flag in a STYLE statement in a dialog template to create an owner-drawn ListView control in a dialog box.

Shortly after a CMyListView object is instantiated, its OnInitialUpdate function is called. In

a document/view application, OnInitialUpdate is where you place the code that initializes a view. After calling the base class's OnInitialUpdate function, CMyListView::OnInitialUpdate switches the ListView control to report view by turning off the style bit that specifies the current view and

turning on the bit that signifies a report view:

```
ModifyStyle (LVS_TYPEMASK,
    ~LVS_REPORT);
```

It then calls CListCtrl::InsertColumn four times in succession to add columns labeled File Name, Size, Created, and Last Modified to the ListView control:

```
GetListCtrl().InsertColumn (0,
    "File Name", LVCFMT_LEFT, 192);
GetListCtrl().InsertColumn (1,
    "Size in Bytes", LVCFMT_RIGHT,
    ~128);
GetListCtrl().InsertColumn (2,
    "Created", LVCFMT_CENTER, 128);
GetListCtrl().InsertColumn (3,
    "Last Modified", LVCFMT_CENTER,
    ~128);
```

In MFC, CListCtrl represents raw ListView controls, and CListView is a CView wrapper around a CListCtrl. Before you call CListCtrl functions on a CListView, you must first call GetListCtrl to obtain a reference to the underlying CListCtrl. That's why each call to InsertColumn is preceded by a call to GetListCtrl.

After adding columns to the ListView, OnInitialUpdate calls CMyListView::AddFileInfo to initialize the control with a list of file-

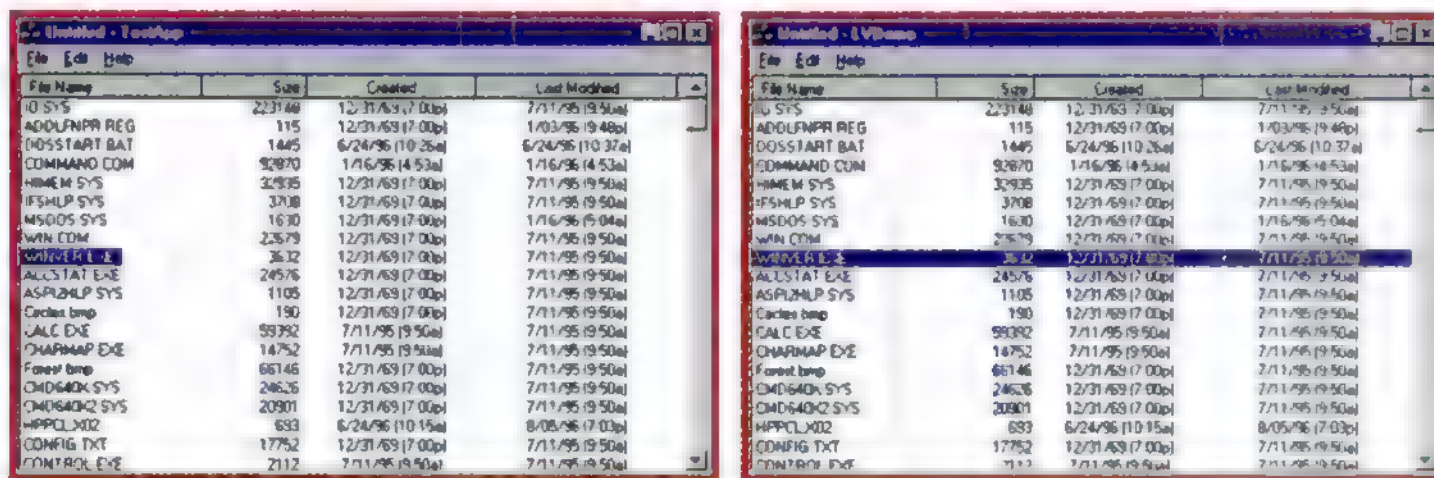


FIGURE 1: A standard ListView control (left) highlights selected items by highlighting text in the leftmost column. With a little work, ListView controls can be modified to highlight entire rows (right).

with MFC, you don't have to be an MFC programmer to benefit from it. The principles discussed in this article also apply to ListView controls in SDK applications.

THE LVDemo APPLICATION

The first thing to do, if you haven't done so already, is to download the source code for LVDemo. You can get it either from our Web site or from ZD Net on CompuServe. (For details, see the sidebar "Guide to Our Utilities" in this issue's Utilities column. Look for the file Lvdemo.zip within the volume archive file v15n20.zip.)

The portion of LVDemo that interests us is the CMyListView class, which renders views of the application's data. That data is a list of the files in the host PC's Windows directory. CMyListView lives in the source code files DemoView.h and DemoView.cpp. The source code for the application, document, and frame window classes are standard document/view files similar to those generated by Visual C++'s AppWizard.

The first thing to notice about the sample application's CMyListView class is that it overrides CListCtrl::PreCreateWindow and ORs an LVS_OWNERDRAWFIXED flag into the control's style bits. This makes the ListView an owner-drawn control. To create an owner-drawn list-view window in an SDK application,


```

void CMyListView::MeasureItem (LPMEASUREITEMSTRUCT lpmis)
{
    //
    // Compute the height of each line in the list view
    // from the font height.
    //
    LOGFONT lf;
    CFont* pFont = GetFont ();
    pFont->GetLogFont (&lf);
    lpmis->itemHeight = abs ((int) lf.lfHeight) + 6;
}

void CMyListView::DrawItem (LPDRAWITEMSTRUCT lpdis)
{
    //
    // Create a CDC object from the DC handle provided to
    // us.
    //
    CDC dc;
    dc.Attach (lpdis->hDC);

    //
    // Initialize a CRect object with a rectangle that
    // surrounds the item
    // and its subitems.
    //
    CRect rect = lpdis->rcItem;

    //
    // Retrieve a pointer to the ITEMINFO structure that
    // holds the item's
    // data. lpdis->itemID is the 0-based index of the
    // item that we're being
    // asked to paint.
    //
    ITEMINFO* pItem = (ITEMINFO*) GetListCtrl
    ->GetItemData (lpdis->itemID);

    //
    // If the item is selected, paint the rectangle with
    // the system color
    // COLOR_HIGHLIGHT. Otherwise, use COLOR_WINDOW.
    //
    CBrush* pBrush = new CBrush (::GetSysColor ((lpdis-
    ->itemState &
    ODS_SELECTED) ? COLOR_HIGHLIGHT : COLOR_WINDOW));
    dc.FillRect (rect, pBrush);
    delete pBrush;

    //
    // If the item has the input focus, draw a dotted
    // focus rectangle.
    //
    if (lpdis->itemState & ODS_FOCUS)
        dc.DrawFocusRect (rect);

    //
    // Draw the text of the item and its subitems.
    // If the item is selected,
    // the text color is set to COLOR_HIGHLIGHTTEXT
    // first. Values for the
    // item and subitems are retrieved through the
    // ITEMINFO pointer initialized earlier, converted to
    // text, and displayed by our own
    // DrawItemText function.
    //
    if (lpdis->itemID != -1) {
        COLORREF crOld;
        BOOL bReset = FALSE;

        if (lpdis->itemState & ODS_SELECTED) {
            crOld = dc.SetTextColor (::GetSysColor
            ->(COLOR_HIGHLIGHTTEXT));
            bReset = TRUE;
        }

        CString string;
        for (int i=0; i<4; i++) {
            LV_COLUMN lvc;
            lvc.mask = LVCF_WIDTH | LVCF_FMT;
            GetListCtrl ().GetColumn (i, &lvc);
            int nFormat = lvc.fmt & LVCFMT_JUSTIFYMASK;
            int nWidth = lvc.cx;

            switch (i) {

                case 0: // File name
                    DrawItemText (&dc, pItem->strFileName,
                    ->rect, nWidth,
                    nFormat);
                    break;

                case 1: // File size
                    string.Format ("%u", pItem->dwFileSize);
                    DrawItemText (&dc, string, rect, nWidth,
                    ->nFormat);
                    break;

                case 2: // Date and time created
                    DrawItemText (&dc,
                    (LPCTSTR) TimeToString (pitem-
                    ->ftCreationTime),
                    rect, nWidth, nFormat);
                    break;

                case 3: // Date and time modified
                    DrawItemText (&dc,
                    (LPCTSTR) TimeToString (pitem-
                    ->ftLastWriteTime),
                    rect, nWidth, nFormat);
                    break;
            }
            rect.left += nWidth;
        }

        if (bReset)
            dc.SetTextColor (crOld);
    }

    //
    // Detach the control's DC from our
    // own CDC object so the former won't
    // be deleted when this function ends.
    //

```



(continues)

FIGURE 2: The *MeasureItem*, *DrawItem*, and *DrawItemText* functions allow *CMyListView* to highlight a *ListView*'s whole row when it's selected.

```

dc.Detach ();
}

void CMyListView::DrawItemText (CDC* pDC, CString text,
    CRect rect,
    int nWidth, int nFormat)
{
    //
    // Make sure the text will fit in the prescribed
    // rectangle, and truncate it if it won't.
    //
    BOOL bNeedDots = FALSE;
    int nMaxWidth = nWidth - 4;

    while (GetListCtrl ().GetStringWidth ((LPCTSTR) text)
        > (nMaxWidth - 4)) {
        text = text.Left (text.GetLength () - 1);
        bNeedDots = TRUE;
    }

    if (bNeedDots) {
        if (text.GetLength () >= 1)
            text = text.Left (text.GetLength () - 1);
        text += "...";
    }

    //
    // Draw the text into the rectangle using MFC's handy
    // CDC::DrawText
    // function.
    //
    rect.left += 2;
    rect.right = rect.left + nMaxWidth;

    UINT nStyle = DT_VCENTER | DT_SINGLELINE;
    if (nFormat == LVCFMT_LEFT)
        nStyle |= DT_LEFT;
    else if (nFormat == LVCFMT_CENTER)
        nStyle |= DT_CENTER;
    else // nFormat == LVCFMT_RIGHT
        nStyle |= DT_RIGHT;

    pDC->DrawText (text, rect, nStyle);
}

void CMyListView::FreeItems ()
{
    //
    // Delete the ITEMINFO structures allocated when the
    // control was created.
    //
    int nCount = GetListCtrl ().GetItemCount ();
    if (nCount) {
        for (int i=0; i<nCount; i++)
            delete (ITEMINFO*) GetListCtrl ().GetItemData
                (i);
    }
}

```

FIGURE 2 (CONT.)

names. The path name is obtained with the API function `GetWindowsDirectory`, and the files are enumerated using the Win32 functions `FindFirstFile` and `FindNextFile`. `AddFileInfo` uses a helper function named `AddItemToListView` to insert items into the `ListView`, and `AddItemsToListView` in turn inserts items using the `ListView`'s `InsertItem` function:

```

BOOL CMyListView::AddItemToListView
(WIN32_FIND_DATA& fd)
{
    // Allocate an ITEMINFO structure
    // to hold the item's data.
    ITEMINFO* pItem;
    try {
        pItem = new ITEMINFO;
    }
    catch (CMemoryException* e) {
        e->Delete ();
        return FALSE;
    }
    // Initialize the ITEMINFO structure's
    // fields.
    pItem->strFileName = fd.cFileName;
    pItem->dwFileSize = fd.nFileSizeLow;
    pItem->ftCreationTime =
        fd.ftCreationTime;
    pItem->ftLastWriteTime =
        fd.ftLastWriteTime;
    // Add an item to the list view
    // control, and set the item's lParam

```

```

// equal to the address of the
// corresponding ITEMINFO structure.
LV_ITEM lvi;
lvi.mask = LVIF_TEXT | LVIF_IMAGE |
    LVIF_PARAM;
lvi.iItem = GetListCtrl ().
    GetItemCount ();
lvi.iSubItem = 0;
lvi.iImage = 0;
lvi.pszText = NULL;
lvi.lParam = (LPARAM) pItem;
if (GetListCtrl ().InsertItem (&lvi)
    == -1)
    return FALSE;
return TRUE;

```

If you look closely, you'll see that `AddItemToListView` doesn't assign any text to the items it adds to the `ListView`. Instead, it initializes an `ITEMINFO` structure describing each item and copies the structure's address to the item's 32-bit `lParam` field, which holds user-defined data. We'll discuss the reason for that later, but for now be aware that it has nothing to do with the fact that the `ListView` is owner-drawn.

It's what happens next that differentiates a conventional control from an owner-drawn one. Shortly after an owner-drawn `ListView` control is created, it sends its owner a `WM_MEASUREITEM` message. The owner responds by copying the height (in pixels) of each item

to the `itemHeight` field of the supplied `MEASUREITEMSTRUCT` structure. `CMyListView` uses MFC's powerful message-reflection mechanism to handle `WM_MEASUREITEM` messages itself rather than delegate them to its owner. An `ON_WM_MEASUREITEM_REFLECT` macro in `CMyListView`'s message map activates `CMyListView::MeasureItem` (shown in Figure 2) whenever a `WM_MEASUREITEM` message arrives, and `MeasureItem` calculates the item height from the `ListView`'s font height:

```

LOGFONT lf;
CFont* pFont = GetFont ();
pFont->GetLogFont (&lf);
lpmis->itemHeight =
    abs ((int) lf.lfHeight) + 6;

```

Adding 6 to the font height gives an owner-drawn `ListView` control the same interline spacing as a conventional `ListView` control.

An owner-drawn `ListView` control does its painting in response to `WM_DRAWITEM` messages. The control's owner receives one `WM_DRAWITEM` message for each item that needs painting, and with the message comes a pointer to a `DRAWITEMSTRUCT` structure containing an item number, a device context handle, a rectangle specifying where on the DC's display surface the item should be drawn, and other information. `CMyListView` uses message reflection to map `WM_DRAWITEM` messages to its own

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DrawItem function (also shown in Figure 2), and CMyListView::DrawItem does the drawing. Most of the code in DrawItem is devoted to painting the text of the item (the string in the ListView's leftmost column) and its subitems (the strings in the other columns).

The helper function DrawItemText (also shown in Figure 2) performs the actual text output, ultimately using CDC::DrawText to paint each text string on the screen but also checking that the string will fit within the column width and truncating it if it won't. A truncated string has an ellipsis ("...") appended to it, so it's obvious that the full text of an item or subitem can't be shown. This is an important detail that you must handle yourself when you choose to make a ListView control owner-drawn; a conventional ListView control handles truncation on its own.

For us, the most interesting part of CMyListView is the DrawItem code that paints selection rectangles around selected items. If a WM_DRAWITEM message pertains to an item currently in a selected state, the ODS_SELECTED bit is set in the DRAWITEMSTRUCT's itemState field. CMyListView::DrawItem checks this bit and paints the item background with the system color COLOR_HIGHLIGHT or COLOR_WINDOW, depending on whether the item is selected or unselected:

```
CBrush* pBrush = new CBrush (
    ::GetSysColor ((lpdis->itemState &
        ODS_SELECTED) ? COLOR_HIGHLIGHT :
        COLOR_WINDOW));
dc.FillRect (rect, pBrush);
delete pBrush;
```

The key here is that the rectangle passed to FillRect circumscribes the item *and its subitems*. A normal ListView control doesn't paint the entire rectangle; it only paints the background behind the text in the left-hand column. The fact that CMyListView uses the whole rectangle means that its highlight bars span the width of each item and its subitems, stretching from the left end of the control to the right end of the rightmost column.

DrawItem contains other interesting code as well. For example, an ODS_FOCUS flag in DRAWITEMSTRUCT's itemState field indicates that the item has the input focus. If the flag is set, DrawItem uses CDC::DrawFocusRect to draw a dotted focus rectangle, again using the whole item width. And take a look at the following statements, which DrawItem executes before drawing each item or subitem in order to determine the width of the column and the column's format (left-, center-, or right-aligned):

```
LV_COLUMN lvc;
lvc.mask = LVCF_WIDTH | LVCF_FMT;
```

```
GetListCtrl().GetColumn (i, &lvc);
int nFormat = lvc.fmt &
    LVCFMT_JUSTIFYMASK;
```

Called with an LVCF_FMT flag, CListCtrl::GetColumn copies an integer specifying the text alignment (LVCFMT_LEFT, LVCFMT_CENTER, or LVCFMT_RIGHT) to an LV_COLUMN structure's fmt field—or so the documentation says. In truth, the value copied to fmt contains other bit flags, too. If you don't AND that value with LVCFMT_JUSTIFYMASK, which is defined for you in the header file Commctrl.h, comparisons to LVCFMT_LEFT, LVCFMT_CENTER, and LVCFMT_RIGHT will fail. This is one of those annoying little glitches that can cause you to pull your hair out if you don't know about it as you test and debug a program.

SORTING BY COLUMN

Earlier, I mentioned the way in which LV-Demo's AddItemToListView function adds items to the ListView. Instead of directly copying string pointers to the LV_ITEM structures passed to CListCtrl::InsertItem, it initializes an ITEMINFO structure with information about the item and sets the item's lParam equal to the structure's address. DrawItem retrieves the item's lParam value by passing the item index in DRAWITEMSTRUCT's itemID field to CListCtrl::GetItemData. It then casts the

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LPARAM returned by `GetItemData` to an `ITEMINFO` pointer, retrieves item and subitem values through that pointer, and uses a switch/case block to convert each value to a string, which it displays on the screen. Why the indirection? Why not just assign text to the items and subitems outright and use `CListCtrl::GetItemText` to retrieve the strings?

The simple answer is that indirection is necessary if the `ListView` is to have sortable columns. You may not have noticed it, but if you click on one of the column headers in the `LVDemo` window, the `ListView` performs a columnar sort. The button click activates `CMyListCtrl::OnColumnClick`, and `OnColumnClick` calls `CListCtrl::SortItems` to sort the column. The `ListView` control does much of the work for you. You supply a callback function that's capable of looking at two programmer-defined 32-bit values and determining which one should come before the other (in `LVDemo`, that function is called `CMyListCtrl::CompareFunc`), and the control calls the callback function as many times as it needs to, to perform a full sort on the data.

The problem is this: When a `ListView`'s user-defined comparison function is called, it isn't given pointers to `LV_ITEM` structures for the items it's being asked to compare. Instead, it's passed each item's 32-bit LPARAM, along with another programmer-defined 32-bit

value (LPARAMSort) that indicates what kind of sort is desired. In this case, LPARAMSort holds the zero-based number of the column to be sorted. In order to compare the two items, the comparison function must be able to access all of an item's data, given only the item's LPARAM. The logical way is to make LPARAM a pointer to a structure holding the item's data—in `LVDemo`'s case, a pointer to an `ITEMINFO` structure. An owner-drawn `ListView` control can use that pointer to retrieve the information it needs to paint item and subitem text. A conventional (non-owner-drawn) `ListView` control can do essentially the same thing, by initializing each `LV_ITEM` structure's `pszText` field with the special value `LPSTR_TEXTCALLBACK` and providing item and subitem text to the control in response to `LVN_GETDISPINFO` notifications.

Different, yes. But it makes sense when you consider that there are many types of data that can be sorted properly only if sorted before being converted to text format. Take `LVDemo`'s "Created" and "Last Modified" columns, for example. Internally, the data for these subitems is stored in `Win32 FILETIME` structures. Times and dates encoded in `FILETIME` structures are easily compared with the `CompareFileTime` API function, but they're not so easily compared if they're converted to text strings first. After all, 6/30/96 comes be-

fore 12/2/96 on the calendar, but in a string comparison, "12/2/96" comes first. My guess is that when the code gods at Microsoft decided to supply only LPARAMs to a `ListView`'s comparison function, they assumed that you'd be storing sortable data in a binary format that could easily be accessed through a pointer.

One detail you mustn't forget when you allocate your own memory for `ListView` items is that the memory has to be freed. `CMyListView`'s `WM_DESTROY` handler deletes the `ITEMINFO` structures created by `AddItemToListView` by executing a simple for loop that retrieves each `ListView` item's LPARAM, casts it to an `ITEMINFO` pointer, and calls `delete` on the pointer. For details, see `DemoView.cpp`'s `CMyListView::OnDestroy` function.

IN CLOSING

There you have it: a sortable `ListView` control that draws full-width highlight bars. One thing my sample code doesn't do is draw images next to the item text in the left-hand column if the `ListView` is assigned an image list. `CMyListView::DrawItem` draws text only, but it wouldn't be difficult to modify it to draw images as well. As my old college textbooks said, the implementation is left up to you. □

Jeff Proise is a contributing editor of PC Magazine.

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By Michael J. Mefford

Play Backgammon with Your PC

A computerized version of the ancient game of luck and skill.

Backgammon is an ancient and fascinating game that is played worldwide and is especially popular in eastern Mediterranean countries. The game requires a nice balance of luck and skill: Although fluke rolls will occasionally influence a game, in the long run the most skillful player will win the most games. The game is deceptively simple to play yet rich in strategic possibilities. Backgammon is my favorite game, and this issue's free program is a software version that can be played against another person or against the computer.

You can obtain Backgammon for free by mail or by downloading it from PC Magazine Online. (Refer to the sidebar "Guide to Our Utilities" for details.) The source code for Backgammon—which was written with Borland's visual programming tool, Delphi—is also provided, for those interested in seeing how it works.

THE RULES OF BACKGAMMON

Backgammon is played on a board with triangular designs called *points* (see Figure 1). The colored disks are called *stones*. Each player has 15 stones. The object of the game is to move all your stones from point to point around and then off the board before your opponent does the same.

Players move in opposite directions. In Figure 1, red moves clockwise, from point 24 toward point 1, and blue moves counterclockwise, from point 1 toward point 24. Red's home area is the quadrant containing points 1 through 6; blue's home area is the quadrant with points 19 through 24. The crossover to the other side of the board lies between points 12 and 13. A player can start taking stones off the board—called *bearing off*—after moving all of them into the home area.

A roll of the dice determines the number of points a player can move on each turn. You consider the numbers on each die separately and make two moves on each play. You can use one stone or two for the moves and either of the dice for the first move. When you roll doubles, you move twice for each die, for a total of four moves.

When you move a stone, it must land on an *open point* or a *point you own*. A point is open if it is vacant or if it has one stone on it. You

own a point if you have two or more stones on it. You cannot land on a point owned by your opponent, even if it's only for a moment before you move on, with the same stone, for the second part of the roll. You can, however, pass over a point owned by your opponent. There is no limit to the number of stones you can pile onto a single point.

You must play all possible moves; you cannot pass either part or all of your turn if a legal move is available to you. If you can't move one or both of your stones, you sacrifice whatever move you can't make. If only one number can be played, then you must play the higher one, if possible.

IN THIS ISSUE

Backgammon

The object of the game is to move all your stones from point to point around and then off the board before your opponent does the same.



Any point that has only one stone on it is called a *blot*. If you land on your own blot, you make the point and thus own it. If you *hit* an opponent's blot (by landing on it), your stone stays on the point and your opponent's stone moves to the *bar* in the center of the board. You are not obligated to hit an opponent's blot.

Although it is physically in the center of the board, you can think of the bar as one point beyond the point farthest away from home. For red, this would represent point 25, and for blue, point 0. If you have any stones on the bar, you must move them back onto the board before you can move any other stone. If your opponent owns points in the quadrant where you reenter, you can be blocked from reentering and forced to sacrifice moves.

Once you have brought all your stones to your home area, you can start to bear them off the board. In bearing off, you are in effect moving one point past your home area. You must bear off with an exact roll of the

dice, unless you have no stones on the corresponding point (for example, the third point for a roll of three) and no stones on any points farther away. For example, let's say you are playing blue and have only two stones left, on points 3 and 5, and you roll a six and a two. You must first move the stone on point 5 off the board, since you have none on the sixth point. You must then move the stone on the third point down two points to the first point. If you were to roll a four and a three in the same position, you would have to move the stone on the fifth point down to the first point and then move the stone on the third point off the board. If you are hit while bearing off, you must reenter on the far side of board and bring the stone around again before you can continue bearing off.

If you bear off all your stones before your opponent does, you win. It's a single-point win if your opponent has moved at least one stone off the board. If your opponent has not yet begun bearing off, it's a two-point win, called a *gammon*. If, in addition, your opponent has at least one stone in your home area, it's a three-point win, called a *backgammon*—very difficult to achieve.

If you learn the rules of backgammon, you'll know how to play the game, but you won't necessarily know how to play well. You can learn about winning strategies by reading the section below on Backgammon "innards," the strategies the program employs to play a good game. Additional information on strategy can be found in Backgammon's help file.

PLAYING BACKGAMMON

To install Backgammon, copy the program files Backgamn.exe and Backgamn.hlp to a subdirectory on your hard disk and create an icon for Backgammon in your shell. Backgammon is a 16-bit Windows program and will run under Windows 3.1, Windows 95, and Windows NT.

When you launch Backgammon, you'll see a picture of a backgammon board set up for a new game, with program option controls along the right edge (see Figure 2). You can play Backgammon against the computer or another person; the Against buttons let you choose. Click on the button with a picture of

a computer to play against the computer; click on the button with a picture of a person to play against a human opponent. (Backgammon defaults to computer-opponent play mode the first time you run it.) Red makes the first play, and the computer always plays blue.

A player rolls the dice by clicking on the Roll button. You can then use the mouse to drag a stone to a new location. The cursor changes into a hand grasping the stone while you are dragging. When the cursor is over a point where you can legally put the stone, the grasping hand opens up. If you attempt to drag a stone that cannot legally be moved, the cursor will not change into a hand. That's the only clue you'll get to an illegal move; there are no annoying beeps.

You must drag stones in the order in which they are stacked on a point, starting with the stone closest to the pointed end and working down toward the base. If the point has more than one layer of stones, you must take all stones from the topmost layer before moving to the next lower layer.

Before the computer makes a move, it flashes the point from which it is moving the stone and then flashes the destination point. The slide control at the bottom of the options panel lets you control the speed at which the computer moves. You'll find this especially handy at the beginning of the game, when there are many stones on the board and it can be difficult to see what the computer is doing if it moves too quickly.

Backgammon keeps a running score for red and blue across sessions, adding one point for a single-point win, two points for a gammon, and three points for a backgammon. To reset the scores to 0, click on the Clear button.

BACKGAMMON INNARDS

With some applications, the main programming challenge is a tricky interface; others contain complex algorithms that are difficult to implement. With Backgammon, the most difficult part to program was the computer play portion. The challenge was in selecting which principles of good play to implement and then choosing the correct strategy for a given situation.

I started by distilling my knowledge of the game down to 16 fundamental playing strategies. I then organized those strategies hierarchically in a procedure called Computer (see Figure 3). At each step, Computer checks to see if it can implement a given strategy. If it can, it does, and if it can't, Computer checks the next strategy in the hierarchy. When it finds one that fits the situation, Computer stops looking and makes its move. Backgammon does not take a more computation-intensive

approach of rating all possible moves and then choosing the one that scores highest. For that reason, the order in which Computer examines its strategic options is as important as the effectiveness of each individual strategy.

The play strategies are presented below in the order in which the procedure tests them. One odd thing you'll notice is that endgame strategies, such as bearing off, are near the top of the hierarchy, while strategies such as creating builders for new points are toward

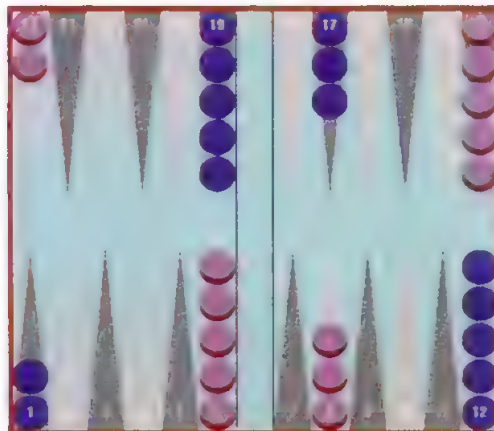


FIGURE 1: This diagram shows a backgammon board at the start of a game. The points are numbered for easy reference.

the bottom. That is because endgame strategies, such as bearing off quickly, are crucial to winning and must thus be considered first. If Computer can't bear off because not all its stones are in its home area, then the conditions for the strategy won't be met and Computer will try the next one. (The actual code implementing the strategies is too long to be included with this article, but the complete source code is available from PC Magazine Online.)

Backgammon uses Delphi's Random function to provide the dice rolls, which are stored in an array of structures called Roll. The Roll structure has two components: Die, the number shown on the die, and Used, a boolean (or switch) that indicates whether the die has been played yet. Roll can contain up to four elements (the number of moves you get if you roll doubles). A separate variable, MovesCount, keeps track of the number of unused dice moves.

```
MovesCount : integer;
Roll : array [1..4] of record
    Die : integer;
    Used : boolean;
end;
```

Possible moves are stored in an array structure called ComputerMove, each element of which has three components: FromPoint, Roll, and ToPoint. The FromPoint and ToPoint variables are, as their names suggest, a

stone's source and destination points. The variable ComputerMove.Roll is an index into the Roll array described above, and indicates which die roll to use to make the move. The ComputerMove array can contain up to four elements, one for each roll of the two dice and twice that for doubles.

```
Index : integer;
ComputerMove : array [1..4] of record
    FromPoint : integer;
    Roll : integer;
    ToPoint : integer;
end;
```

Some of the strategies called by Computer use only one of the dice to come up with one move for one stone. Others use both dice to come up with either two moves for one stone or a combination move with two stones. The OpeningMove strategy is the only one that ever stores all four moves, and that in the special case of doubles.

When Computer finds a move, the procedure stores it, enables the Timer1 procedure, and exits. Timer1 then executes the move, which is stored in ComputerMove. Timer1 decrements the MovesCount variable after the move and calls Computer to determine the next move, if there are any unplayed dice rolls.

Some of the strategies in the decision hierarchy have overlapping elements. But since the code executes quickly, I didn't worry about duplication; my main concern was to make sure I didn't overlook some situation. The following is the step-by-step logic Computer employs in order to decide on the computer's next move.

1. Can move? Computer first checks to see if there is at least one move on the board for blue (the computer always plays blue). It looks at every point to see if there is a legal move in the remaining unused dice rolls. Of course, if blue has a stone on the bar, it has to move that stone back into play before any other move can be considered legal. If there are no legal moves, Computer displays the message, "Sorry, no moves," turns the play over to red, and exits.

2. Is opening roll? Like chess and checkers, backgammon has classic opening moves. The Computer procedure uses a constant array called OpeningMoves that contains an entry for every possible combination of the dice. For example, if on a roll of doubles, the program moves pieces in pairs to make new points. The only situation in which the OpeningMoves array isn't used occurs when red's opening move (remember, red always moves first) blocks blue's. In that case, Computer uses the strategies outlined below to find an alternative move.

3. Can bear off? Bearing off comes at the end of the game, but because of its extreme impor-

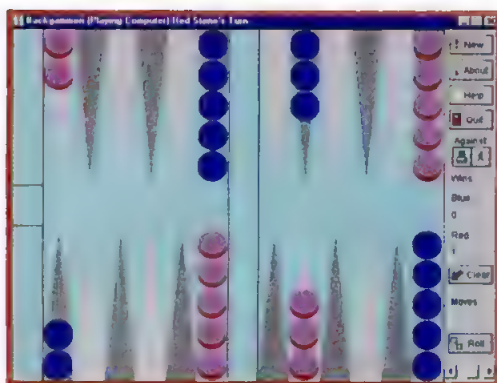


FIGURE 2: The option controls for Backgammon are available on the right-hand side of the window.

tance in the game, the possibility of bearing off is checked at the beginning of Computer's strategic hierarchy. A player can bear off only if all his stones are within his home area, so Computer checks that first. If all stones are home, the CanBearOff function moves stones off the board where possible.

If red is still in blue's home area and bearing off would create a blot that would leave blue vulnerable to a red hit, Computer tries one of five other possibilities before bearing off. First it tries to take care of any blue blot, either by covering it with another stone or by clearing the point. If there are no blue blots, Computer tries to clear the farthest point, rolling its stones forward. That gives red a place to enter (if it's on the bar) and also sets up blue to bear off quickly. Lacking that possibility, Computer tries to make a point. If it can't, Computer tries to *run* a stone—that is, move a distant stone toward home as quickly as possible—without leaving a blot. If Computer cannot move without leaving a blot, then it tries to hit red while moving.

Once blue has cleared as many points as possible, hitting red is often effective in forcing red to leave Computer's home area, so that blue can bear off in peace. For example, if Computer clears all points except 23 and 22 and hits red, then a roll of four or better will force red to reenter the board beyond blue's remaining home-area stones, where it will no longer be a threat.

4. Is stone on the bar? Because you must get any stones on the bar back into play before making any other move, checking the bar is the next logical step. Computer could move off the bar randomly with any unused dice rolls, but it tries to be a little smarter than that. First Computer tries to make an advanced anchor on point 4 or 5 of the opponent's home area, by moving the stone from the bar to a high point and then covering with a stone from the board. Failing that, Computer tries to hit a red blot or cover one of its own blue blots. If it can't do either, the next attempt is to move the stone to an empty point, in the hope of advancing the anchor

on the next turn. If all else fails, blue then gets off the bar with the first roll that allows it to do so.

5. Is running game? The game becomes a *running game* when all stones have passed each other and no further hitting is possible. The running game comes late but, like the bear-off logic, comes high in the prioritized strategy scheme. In a simple race, Computer doesn't waste time making unneeded points. It moves all the stones home as quickly as possible so that it can start to bear off. The running-game logic is to move the farthest stone toward home.

6. Can hit a red blot? All strategies before this point were defensive in nature. Hitting an opponent's blot, however, is one of the most powerful offensive moves in backgammon, and that's what Backgammon tries to do as its first elective strategy. Computer looks for blots to hit, starting with those closest to red's home area, since those are the ones that will set the opponent back the most.

Computer considers four types of hits: hitting the blot and then taking ownership of the point with a second stone (obviously one of the best moves); hitting a blot with just one stone; hitting the blot and continuing on with the same stone, using the second roll; hitting the blot with one stone on the second roll. Hitting is a double whammy: It sets the opponent back in the race and also forces him to be occupied with getting off the bar instead of advancing.

There are times when Computer doesn't choose to hit. Hitting deep in one's own home area doesn't set one's opponent back many points and is always dangerous if the hit can't be covered—that is, when the stone that makes the hit becomes a blot itself. But even here there are exceptions. If you have a solid blocking prime, hitting in the home area in an attempt to advance the prime is a good strategy. Computer doesn't have any special function to cover this situation. Placing too many stones on the bar—and ultimately in your home area—isn't necessarily the best strategy, since this will make it difficult for you to bear off safely. Computer doesn't have any special function for this situation either. Programmers might want to add their own.

7. Can advance anchor? Earlier I described how Computer attempts to make an advanced anchor with a stone on the bar. The next strategy is to try to make an advanced anchor with stones already on the board. An advanced anchor is very important for a safe escape late in the game.

8. Can block? Next comes an attempt to keep the opponent's stones from leaving blue's home area and at the same time build a prime. A roll of six is often used to make a

fast escape from the home area; thus, the point six points away from your opponent's stone is the most important one to block, in order to take away that escape path. The point five points away is the next most important and so on, down to one point away. Making all six of these points is a prime.

There is one instance when you would not want to make such an "up close and personal" prime. If your opponent has an anchor on point 24, you would not want to make the prime on points 18 through 23. That's too deep in the home area, and your opponent is likely to jump over it using any holes in the prime. Instead, the primes of choice are points 16 through 21 and 17 through 22. Making just a few of these points will block high escaping rolls. Your opponent will have to move up in the home area before leaping over, which can take two turns, and will probably leave a blot, which you may point and add to your prime at the same time.

9. Can run home blot? Just as hitting your opponent's blots is important to you, hitting your blots is important to your opponent. Moving them out of range is thus an important strategy, especially if you can get them

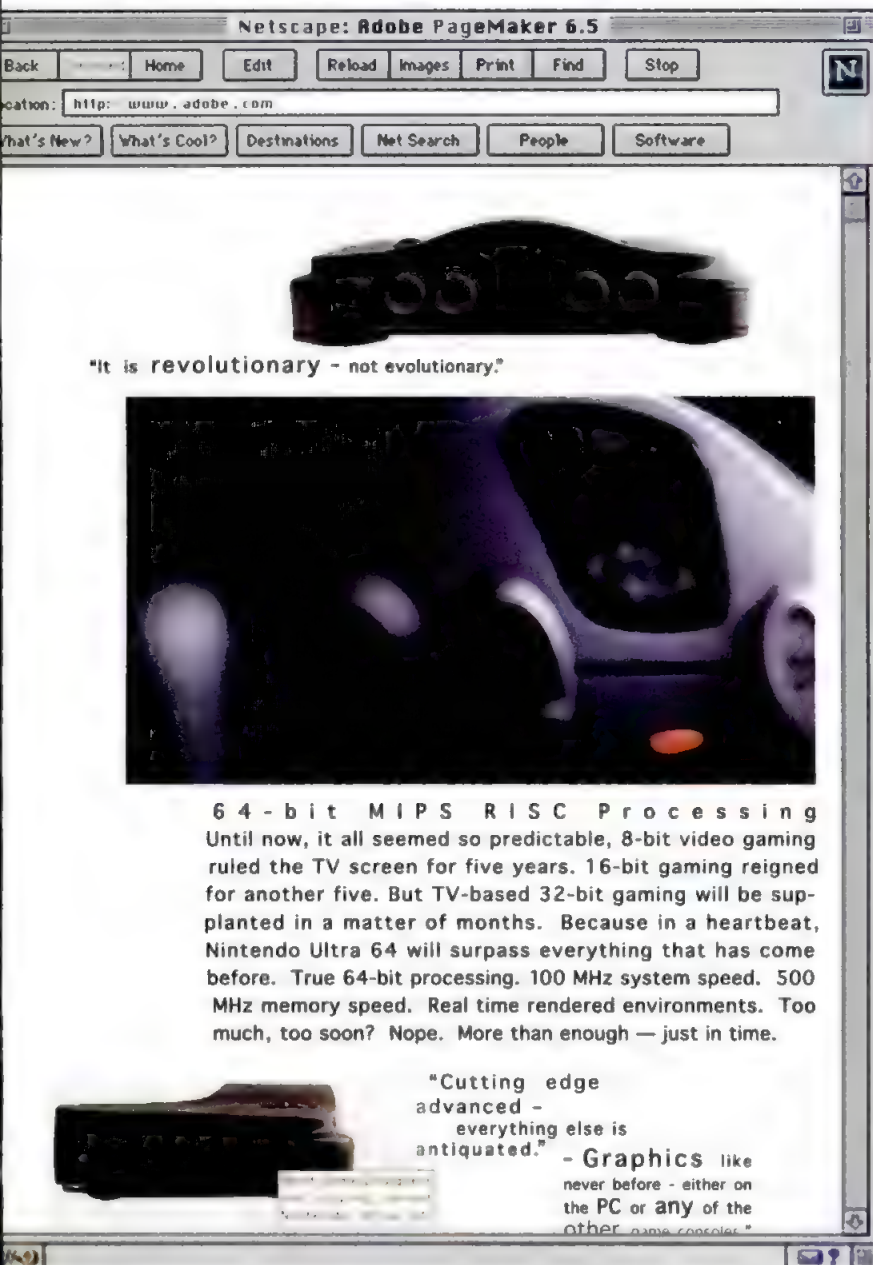
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- 10 **INCTR2** Monitors program installation

out of your opponent's home area before you are blocked. Running a home blot, therefore, is Computer's next strategy. (The advanced-anchor logic in step 7 has already considered whether the blot can be used to make an advanced anchor.)

10. Can cover blot? After checking for blots in the home area, Computer scans the rest of the board for blots, attempting to cover any it finds with any available stone. (A stone is considered available if moving it doesn't break a point or if the resulting blot is out of range of a direct shot by red.) Creating a blot to cover another might seem silly, but covering an advanced blot protects a stone that is closer to

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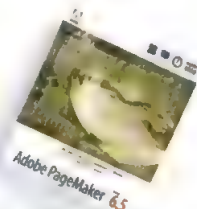
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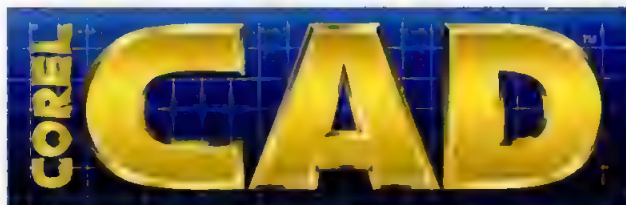
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home. And getting home quicker than your opponent is what backgammon is all about. **11. Can run any blot?** If a blot can't be covered and is in range of a direct shot by red, Computer moves it forward, if possible. Blots that aren't in immediate danger aren't moved. Blots that aren't in range of a direct shot are best used as builders for making points.

Running all blots to safety regardless of the circumstances usually results in many stones piled up on just a few points—especially points 17 and 19, since these are already made at the start of the game. The apparently safe position will soon deteriorate, however, because you'll run out of moves and

have to blot in your home area, coming under direct fire from your opponent's anchor. The stronger play is to leave blots for making points on the next turn.

12. Is doubles? Doubles offers the opportunity to make new points, and for this reason stones are usually moved in pairs. Computer considers only vacant points or those that have a red blot on them as destinations.

13. Can make builder? As mentioned above, builders are very important in making new points. Once all the blot moves are considered, Computer attempts to create builders by moving stones to points 14 through 18. Stones on those points can be used in sub-

sequent turns to make blocking points closer to home.

Computer makes sure that a direct-shot blot isn't left behind on the point from which the builder came. Also, Computer won't create a blot within a direct shot of the opponent. (It will leave a blot, however, if the blot is out of range. That will usually be the case in the early part of the game, since red will be far away, on point 24.) One exception: Computer will create a direct-shot blot if red is on the bar. The odds of getting hit in this case are cut in half, since part of the opponent's next roll will be used to get off the bar.

14. Can clear point? Late in the game, it's good

```

procedure TMainForm.Computer;
var
  i, j, k : integer;
begin
  TimerCount:= 0;

  if not CanMove then exit;

  if FirstRoll then
  begin
    FirstRoll:= false;
    if OpeningMove then
      exit;
  end;

  if (AllHome) and
    (CanBearOff) then
    exit;

  if Points[BlueBar].Count > 0 then {on bar}
  begin
    if CanAdvanceAnchor(Roll[1].Dice) then
      exit;
    if CanAdvanceAnchor(Roll[2].Dice) then
      exit;
    GetOffBar;
    exit;
  end;

  if (RunGame) and
    (CanRun) then
    exit;

  for i:= 1 to 7 do
    if HitHomeBlot(i) then
      exit;

  for i:= 1 to 18 do
    if ((RedBlot(i)) and {hit red blots}
      (CanMakePoint(i, BlueBar))) or

      (CanHit(i)) or
      (CanHitAndPass(i)) or
      (CanPassAndHit(i)) then
      exit;

  for i:= 7 downto 2 do

    if CanAdvanceAnchor(i) then
      exit;

  if CanBlock then
    exit;

  for i:= 1 to 6 do
    if (BlueBlot(i)) and {run home blot}
      (DirectShot(i, 1)) and
      (CanRunBlot(i)) then
      exit;

  for i:= 24 downto 1 do
    if (CanCoverBlotOne(i)) or
      (CanCoverBlotTwo(i)) then
      exit;

  for i:= 24 downto 7 do
    if (BlueBlot(i)) and {run blot}
      (DirectShot(i, 1)) and
      (CanRunBlot(i)) then
      exit;

  if (Roll[1].Dice = Roll[2].Dice) then {doubles}
    for i:= 1 to 4 do
      if Roll[i].Used = false then
        for j:= 1 to 4 do
          if (j <> i) and
            (Roll[j].Used = false) then
            for k:= 22 downto 1 do
              if CanMakePoint(k, BlueBar) then
                exit;

  if CanMakeBuilder then
    exit;

  if CanClearPoint then
    exit;

  if CanRunSafeTwoDice then
    exit;

  if CanRunSafeOneDice then
    exit;

  CanRun;
end;

```

Figure 3: The procedure called Computer calls each play strategy in order of preference, thus choosing the best move available.



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strategy to clear points, starting with those farthest from home. Closer points should not be cleared, since they act as stepping stones that allow stones farther away to get home safely. The first point to clear will usually be the anchor in your opponent's home area. The last points you clear are your primes, starting with the point farthest away from home. If your opponent has an anchor in your home area, breaking a prime in the middle increases the odds that you will be hit, because you may leave a blot when bringing home stones at the far end of the prime. These principles are all incorporated into Computer's strategic hierarchy.

15. Can run safely? One of the last things Com-

puter attempts to do, if none of the previous moves can be made, is to run safely with any stone on the board. Computer attempts this with one of the die rolls and also with a combo move with one stone using both of the dice moves. Running is considered safe if doing so doesn't leave a direct-shot blot or create one.

16. Just run! If Computer has gotten this far, it has run out of smart strategies. Now it just runs with the most distant stone that can move. Computer is probably moving into danger, but it has no choice. Moving the farthest stone from home minimizes the risk, since Computer will lose the least if the stone gets hit.

PLAYING A GOOD GAME

This computerized version of Backgammon plays an adequate game, but there are many ways you could improve on it. For example, you could add strategies based on the part of the game you're in: beginning, middle, or end. Or you could add a blitz strategy, in which Computer attacks in its home area to close out its opponent. If you have ideas for some computer play additions, post a message in the Utilities section of the ZD Net Tips Forum on CompuServe. My CompuServe ID is 72241,161. □

Michael J. Mefford is a contributing editor of PC Magazine.

GUIDE TO OUR UTILITIES

ABOUT BACKGAMMON...

PURPOSE Backgammon is an ancient and fascinating game that is played worldwide and is especially popular in eastern Mediterranean countries. The game requires a nice balance of luck and skill.

Backgammon is played on a board with triangular designs called *points*. The colored disks are called *stones*. Each player has 15 stones. The object of the game is to move all your stones from point to point around and then off the board before your opponent does the same.

USAGE To install Backgammon, copy the program files Backgamn.exe and Backgamn.hlp to a subdirectory on your hard disk and create an icon for Backgammon in your shell. When you first launch Backgammon, you'll see a picture of a backgammon board set up for a new game, with program option controls along the right edge. You can play Backgammon against the computer or a human opponent; the Against buttons let you choose. Click on the button with a picture of a computer to play against the computer; click on the button with a picture of a person to play against a human opponent. When you first run Backgammon, the program defaults to the computer. Red makes the first play, and the computer always plays blue.

A player rolls the dice by clicking on the Roll button. You can then use the mouse to drag a stone to a new location. While you are dragging, the cursor changes into a hand that grasps the stone. When the cursor is over a point where it can legally land, the grasping hand opens up. If you attempt to drag a stone that cannot legally be moved, the cursor will not change into a hand. That is the only clue you will get that you are attempting an illegal move; there are no annoying beeps.

Note that you must drag stones in the order in which they are stacked on a point, starting with the stone closest to the pointed end and working toward the base. When a point has more than one layer of stones, you start with the topmost layer.

The slide bar in the lower-right corner lets you control the speed at which the computer makes its moves. (When the computer moves too quickly, it can be hard to see what it has done.)

Backgammon keeps a running score for red and blue across sessions, adding one point for a single-point win, two points for a gammon, and three points for a backgammon. To reset the

scores to 0, click on the Clear button.

You can learn about backgammon rules and strategies by consulting Backgammon's online help file.

SUPPORT Help for PC Magazine's free utilities can be obtained electronically in the Utilities section of ZD Net's TIPS Forum (GO ZNT:TIPS). The authors of current utilities generally visit this forum daily. You may find an answer to your question by reading the messages already posted in the forum. If the author is not available and the forum sysops can't answer your question, the Utilities column editor, who checks this forum each day, will contact the author for you.

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PC Solutions

TIPS AND TECHNIQUES TO INCREASE YOUR PRODUCTIVITY

User-to-User

By Neil J. Rubenking

Cleaning Up Multilevel TEMP Directories

Despite this age of PC-based GUIs, many operating system maintenance tasks are still best performed from the DOS command prompt. One of these is cleaning up after sloppy applications that leave trails behind in the form of temp files. I use an application that is particularly egregious in this regard. It creates a new set of multilevel subdirectories off the system's temp directory each time it runs. After a few sessions, I end up with several unused trees of temporary directories and files that are a hassle to remove manually.

To automate the process, I dug into the undocumented depths of DELTREE. It turns out that with the proper syntax, DELTREE is an efficient tool with which to clear out all the junk in a multilevel directory tree. But if you use DELTREE as documented, it also deletes the directory you are trying to clean up. For example, the command

```
deltree/y c:\temp
```

removes everything, including the TEMP directory itself (the /y parameter suppresses deletion confirmation).

If, however, you add a backslash to the end of the command, so that it becomes

```
deltree/y c:\temp\
```

the TEMP directory is left intact and empty. Nothing in the DOS 6.2x or 7.0 help files gives any hint of this useful behavior. I now use the DELTREE command in my AUTOEXEC.BAT file, to clean up the temp directory automatically each time the system boots.

GEORGE ALLEN
Boston, Massachusetts

PC MAGAZINE: This syntax for DELTREE isn't exactly undocumented, but discovering it takes a bit of thought. DELTREE's name suggests its normal function—to delete an entire specific directory and all of its contents. However, DELTREE can also be used to delete files, even those protected by the read-only, hidden, and system attributes. If you pass a wildcard file specification to DELTREE, it will

delete all files and directories that match the file specification.

When you pass C:\TEMP\ to DELTREE, this is equivalent to passing C:\TEMP*. *. DELTREE deletes all files and directories that match the file specification C:\TEMP*. *. This includes all the files and directories contained in C:\TEMP, but not C:\TEMP itself. What a difference a backslash makes!

Changing the Global Environment in Windows 95

The utility Winset.exe, included with Windows 95, will set global environment variables after Windows 95 is started. For batch files, it's not quite as useful as it might be, because changes don't show up in the DOS session in which it's run. But the changes are applied globally. So, for instance, use Start | Run and type in

```
WINSET foo=bar
```

Then, bring up a DOS box, type SET, and you'll see the new environment variable.

Winset isn't automatically installed with Windows 95. It's on the CD-ROM, buried in the ADMIN\APPTOOLS\ENVVARS folder, or available for download from Microsoft. One use is to let you eliminate Config.sys or Autoexec.bat files that exist only to set a few environment variables. Just use Winset in a batch file in the StartUp folder to set the variables and eliminate the unnecessary initialization files.

DON LEBOW
Lahaina, Hawaii

PC MAGAZINE: A DOS box under Windows is isolated, as far as environment variables go. When it starts, the DOS box gets a copy of the global environment owned by Windows, but then the connection is broken. Changes made in the copy don't affect the global environment. They're not visible in other DOS boxes, and when this DOS box terminates, they're lost.

The Winset utility breaks this isolation, because it acts on the global Windows environment. As noted, changes made with Winset won't affect any DOS box that's already open.

HIGHLIGHTS



OPERATING ENVIRONMENTS

If you're deciding whether you should use Windows 95 or Windows NT as your operating system, there's one important fact you should know. Page 256.



WORD PROCESSING

Using a macro to run a function in Word can be just as easy as inserting information with a field. Page 260.



DATABASES

An undocumented way to modify the Refresh Rate setting in your Paradox 7.0 for Windows Runtime applications. Page 266.

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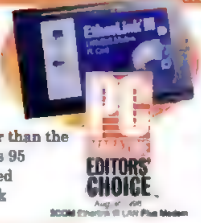
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But you can keep a batch file in synch with the global environment by using SET along with Winset. For example:

```
WINSET foo=bar
SET foo=bar
```

I'm sure you'll find many uses for this hidden command.

Finding All Shortcuts To a File

It can be useful to find all of the shortcuts for a particular file on your machine. You can search for shortcuts on your computer that point to a certain file (target) or that point to a file in a certain directory (target container). Simply go to Find | Files or Folders on the Start

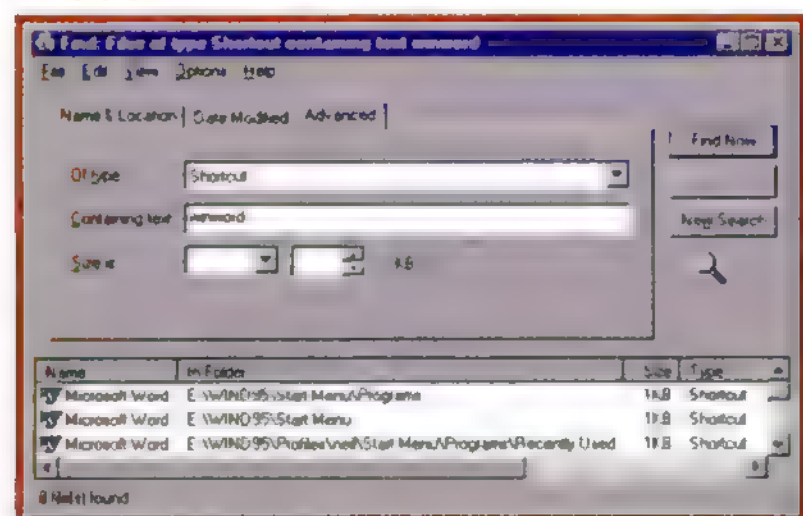


FIGURE 1: You can use the Find command from the Windows 95 Start menu to locate shortcuts pointing to a particular file.

menu. Click on the Advanced tab and choose Shortcut from the Of Type list. In the Containing Text field, type the file or directory name. Make sure that Case Sensitive is not checked under the Options menu. Click Find Now, and a list of shortcuts pointing to your specified target or target container appears. This can be helpful before, say, deleting a directory, to make sure that no shortcut is pointing to a file in the directory you're about to delete.

ANDY GUESS
Potomac, Maryland

PC MAGAZINE: Every item below Programs on your Start menu is a shortcut, and every icon you've placed on your desktop is a shortcut. In Windows 95, shortcut creation is so simple you hardly know you're doing it. But if you move or rename a file, Windows 95 can't always patch up the connection between it and its shortcut. If you delete the file, the shortcut will remain, pointlessly occupying disk space.

By using Find as described here, you can locate all the shortcuts that point to a given file. There may be more than you expect; Figure 1 shows eight shortcuts pointing to Winword.exe alone. Even if you don't intend to move or delete the file, you may want to dispose of shortcuts that aren't needed. The shortcut files

themselves, which have the extension .LNK, tend to be just a few hundred bytes in size, but on an uncompressed drive, each occupies a full cluster. And depending on the capacity of the drive, a cluster can be as large as 32KB.

Stretching Wallpaper Revisited

The User-to-User column of May 28, 1996, contained a tip for getting Windows 95 to stretch the wallpaper image to fill the screen. I tried it with several .BMP files and it didn't work. Because most of my .BMP files are RLE-compressed, I also tried it with the Windows 95 Setup.bmp. It still didn't work.

I know that stretching wallpaper is a feature included with Microsoft Plus! for Windows 95, which unfortunately I don't have. Perhaps this technique works only when the Plus! pack is installed?

MIKE GREEN
via ZD Net

PC MAGAZINE: The original tip stated that adding the value WallpaperStyle=2 to the Registry key HKEY_CURRENT_USER\Control panel\desktop would force Windows 95 to stretch a centered wallpaper bitmap to fill the screen. Alas, as Mr. Green points out, this works only if Microsoft Plus! for Windows 95 is installed on the system. In addition, when the Plus! pack is present, you don't have to use the powerful but dangerous Reg-

istry Editor to stretch wallpaper. Instead, right-click on the desktop, select Properties from the pop-up menu, and click on the Plus! tab in the resulting dialog. You'll find a check box labeled "Stretch desktop wallpaper to fit the screen" at the bottom of the page. Check this box and the wallpaper will be stretched.

Removing Items from The Add/Remove Programs List

For several months, I tried to figure out how to delete items from the Add/Remove Programs Properties box in the Windows 95 Control Panel. I needed to do this because I had removed several programs from my sys-

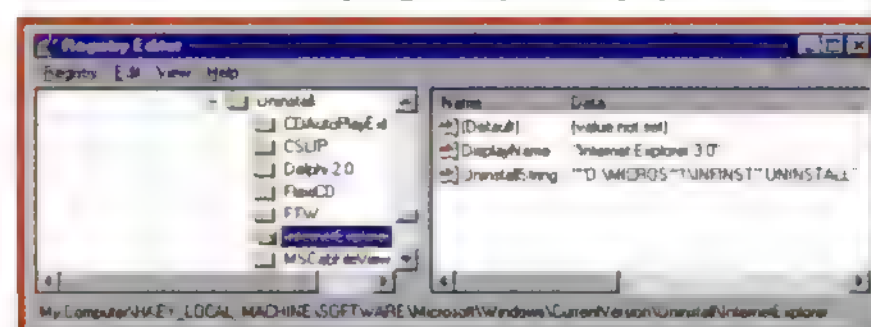


FIGURE 2: The list of uninstall programs used by the Add/Remove Programs applet is stored in the Registry.

tem the old way: I simply deleted them off the hard disk. I learned to uninstall programs using Add/Remove Programs, but I was stuck with entries I couldn't delete because I had already deleted the programs to which they referred. I finally discovered a technique for deleting such orphaned entries.

Select Run from the Start menu, type REGEDIT, and press Enter. Open the folder labeled HKEY_LOCAL_MACHINE by double-clicking on it or by clicking the plus sign next to the folder icon. Now open the SOFTWARE, Microsoft, Windows, and CurrentVersion folders, again by double-clicking or by clicking on the plus signs next to the folder icons. Then open the folder labeled Uninstall and you'll see the items that show up in your uninstall list. Just delete the offending entries. Note that this doesn't remove the items from your .INI files. You'll still need to edit them to remove any changes made by programs you deleted.

CHRIS WOLSKI
Pearl City, Hawaii

PC MAGAZINE: When executed from the Add/Remove Programs applet found in Windows 95's Control Panel, the install program for a Windows 95 application will store instructions for removing that application from the system. This only happens when the program is installed via the Add/Remove Programs applet, and it also only happens when the install program cooperates. If at some later time you decide to remove the application, you bring up the Add/Remove Programs applet again and press the Add/Remove button. Some programs even let you add and remove individual features. But if you do choose to remove the application entirely, it disappears from the Add/Remove Programs list, as well as from your hard disk.

As this reader noted, the problem comes up when you simply blast an offending application from your disk without going through the Add/Remove Programs applet. You can't execute the uninstall program because the app is already gone, and thus the item never gets removed from the list. Most Windows 95 users probably have several phantom items in their Add/Remove Programs lists. The only way to sweep these remnants away is by using the Registry Editor.

In Figure 2, the uninstall entry for Internet Explorer 3.0 is selected in the left-hand pane of the REGEDIT window. The DisplayName value in the right-hand pane is the value shown in the Add/Remove Programs

list, and the UninstallString value is the command that will uninstall the application. With the key highlighted as shown, simply press Delete to remove the item from the Add/Remove programs list. Then shut down REGEDIT right away to avoid accidentally deleting something important.

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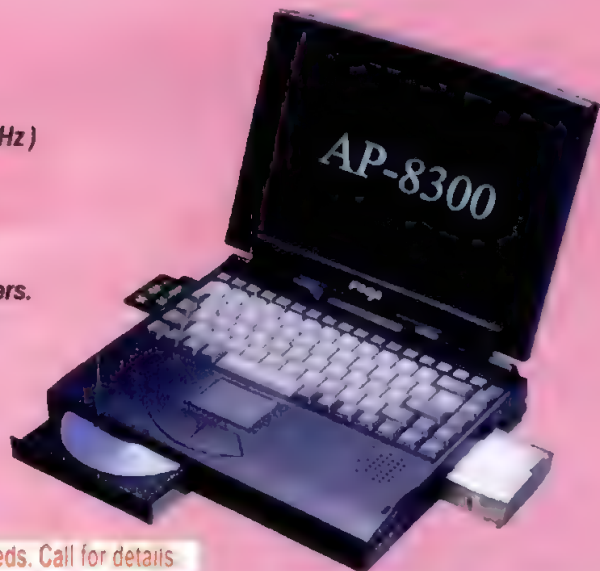
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Ask Our Advisors

OPERATING ENVIRONMENTS

32-Bit Software For Windows



At my office, we plan to install Windows NT Workstation on our desktop PCs. When it comes to software, however, the choice seems to be between Windows 3.x and Windows 95 versions. Will new 32-bit Windows versions become available in addition to the Windows 95 releases? I'm assuming that under Windows NT, 32-bit versions are a better choice than Windows 95 versions.

JEAN C. WILLIS
Galveston, Texas

PC MAGAZINE: Very few software titles are released in separate Windows 95 and Windows NT versions. Windows 95 is basically a 32-bit operating system, even if portions of it do use 16-bit code.

According to Microsoft, the internal instruction sets of Windows NT and Windows 95 are identical. Programmers, however, know that this is not quite true; we often find that an

obscure but valuable function in Windows NT will return a "not implemented" error under Windows 95. Still, the vast majority of 32-bit Windows programs will run under either Windows 95 or Windows NT.

Win NT 3.51 has an antiquated user interface that's hardly different from that of Windows 3.x. In this realm, Windows 95 has the edge. But the upcoming Win NT 4.0 is expected to incorporate and improve on the Windows 95 interface. You won't go far wrong assuming that these two 32-bit Windows platforms will converge more than they diverge.

—Neil J. Rubenking

Multiple Configurations In OS/2

When I'm at the office, I have my laptop computer connected to the network through a PCMCIA card. My CONFIG.SYS file contains a number of device driver references and other settings to support that connection. But when I'm on the road, I get tons of error messages when I boot the system, because it isn't connected to the network. Short of changing

CONFIG.SYS each time I switch from office to mobile mode, or buying a separate program that manages multiple configurations, is there any way to get rid of this problem?

HARVEY SEWARD
Indianapolis, Indiana

PC MAGAZINE: Yes. OS/2 allows you to have more than one CONFIG.SYS file and to switch between them during the boot process. Copy your existing CONFIG.SYS file to the \os2\boot subdirectory. Now switch to the \os2\boot directory and rename the file CONFIG.A. Still in the boot subdirectory, copy CONFIG.A to CONFIG.B. Edit the CONFIG.B file, removing all of the network-specific entries you don't want while you're on the road.

You can select between these two configuration files using the OS/2 recovery screen. Change the prompting in that screen to reflect these new options by editing the \os2\boot\altflbot.scr file. (This file may be marked as read-only, so before editing it, use the command

```
attrib -r altflbot.scr
```

to make sure it can be changed.) You can add up to six lines of text to this file. In this case, you'd want to enter lines similar to

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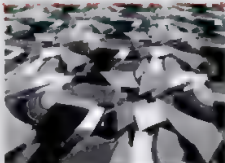
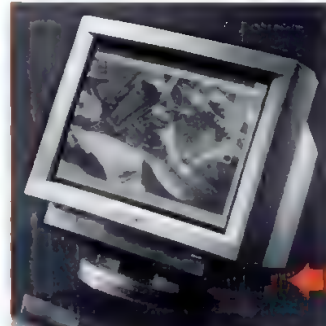


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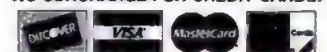
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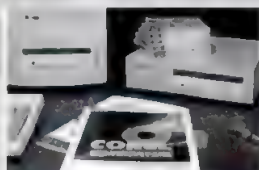


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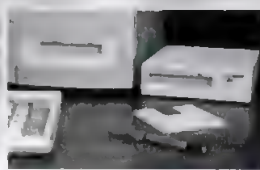


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2147MB	8ms	7200	Seagate	ST32550N	5	\$729	\$789
2150MB	8.5ms	7200	Quantum	XP32150	5	\$639	\$699
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4290MB	8ms	7200	Seagate	ST15150N	5	\$Call	\$Call
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11/19/96 PC Mag

- A) Configure for network use
- B) Configure for remote use

where the letters A and B correspond to the file extensions of the customized configuration files.

Next, you need to tell OS/2 what to do when you select one of those options. Using the editor, create a new file, named `\os2\boot\altfla.cmd`. This file should contain the line

```
copy x:\os2\boot\config.a
x:\config.sys
```

substituting your boot drive letter for the letter x. Now create another new file, named `\os2\boot\altflb.cmd`, with the line

```
copy c:\os2\boot\config.b
x:\config.sys
```

Now, you can select the configuration you want. The first time you boot your system after leaving the office, as soon as "OS/2" appears in the upper-left corner of your screen press Alt-F1. At the bottom of the recovery panel, your two new prompt lines will appear. Simply press the letter B, and the configuration without the network drivers will become active and OS/2 will load without all those error messages while you're gone. The first time you boot on returning to the office, press Alt-F1 again and press the letter A at the recovery screen to reactivate the network drivers. You can actually set up several configurations and choose among them in this way. Note, though, that the recovery screen reserves the letters C, M, V, and X for its own use, so you'll have to use letters other than those for your extensions.

Note also that this technique doesn't just apply to CONFIG.SYS changes. The `altflx.cmd` files can contain any commands you want executed based on the user's selection from the recovery screen.—*Brian Proffit*

WORD PROCESSING

Using Functions in Word for Windows



You can build many interesting functions with WordBasic. Unfortunately, in order to call a function you have to run a macro, which is cumbersome. In many cases it would be more useful if you could define a function for a field. For example, the function

```
Function TargetDate$(delay)
TargetDate$ = Date$(Today() + delay)
End Function
```

could be used in a sentence like "Please send

your payment before {TargetDate\$(21)}."

The field result would be 21 days after the current date. Is there any way to use a function like this without running a macro?

E. DE LE COURT
Belgium

PC MAGAZINE: Word will not let you define functions as fields. (It will let you use formulas as fields, but this is limited to numeric operations.) But using macros does not have to be cumbersome. Inserting information with a macro can be just as easy as—if not

```
Function TargetDate$(delay)
    TargetDate$ = Date$(Today() + delay)
End Function

Sub MAIN
    WhatDate$ = InputBox$("Inserted date should be how many days after today? ", "WhatDate", "21")
    Insert TargetDate$(Val(WhatDate$))
End Sub
```

FIGURE 1: This macro will ask how many days to add to the current system date before inserting the date into your document.

easier than—inserting information with a field.

First, a word about functions, in case you're not already familiar with them: WordBasic offers a large number of built-in functions. For example, the `Today$()` function, which is part of the definition for the `TargetDate$()`, returns the current system date in Word's date-serial-number format. (The number 1 in this format represents December 31, 1899, the number 2 represents January 1, 1900, and so on.) The `Date$()` function, similarly, returns the date corresponding to a serial number date.

You can also define your own functions. The `TargetDate$()` function in the example uses the `Today()` function to get the serial date number of the current date, adds whatever number of days you like, then converts the resulting serial number to an actual date.

To use a macro to insert information from a function into your document, start by creating the macro. For the example of a target date, the macro might look like the one in Figure 1, which uses the `InputBox$()` function to show you a dialog box that asks for the number of days to add to the current system date. After you enter the number of days and choose OK, the macro will calculate and insert the appropriate date. (You can find this macro at PC Magazine Online, www.pcmag.com, under the name TARDAY.DOC.)

One way to make the macro easy to use is to attach it to a menu item, toolbar button, or keystroke combination through the Tools | Customize command. If you plan to create a lot of functions and don't want to worry about forgetting which shortcut keys or toolbar icons to use, the best choice is

to create a separate menu for functions.

To create a function menu, choose Tools | Customize | Menus. Click on the Menu Bar button and then enter a name, such as `&UserFunctions`, in the Name On Menu Bar text box. (The ampersand before the U will make Alt-U the trigger key to open the menu—U being a mnemonic for UserFunctions.) Then specify a position for the menu on the menu bar. If you want the UserFunctions menu between the Window and Help menus, for example, highlight Window in the Position On Menu Bar list box and then choose Add After.

Adding a macro to the UserFunctions menu is just like adding macros or commands to any other menu. To add the first menu entry, choose Tools | Customize | Menus. Highlight the Macros category in the Category list box, go to the Macros list box to highlight the macro you want to add, and make

sure `&UserFunctions` is showing as the choice in the Change What Menu box. If you like, you can then modify the name in the Name On Menu Bar text box.

By default, Word will enter the name of the macro as the name to use on the menu and will add an ampersand at the beginning of the name so that the first letter will be the trigger key for that menu item. You can change the name for the item or change the position of the ampersand so that each menu item has a unique trigger key. Then choose the Add button to finish adding the item.

To add more items, follow essentially the same procedure. You can also define a position by highlighting a current menu item in the Position On Menu Bar box, then choosing the Add Below button to add the item.

Once you've created the menu (and saved the changes with the File | Save All command), you can use the function at any time by choosing it from the menu. This is certainly as easy as inserting data with a field, though you won't be able to update data automatically, as you can with a field.

Also note that for this particular macro, you may need to set the date format for Word to get the format you want. For Word 6.0, you can define the format in a `DateFormat=` line in the [Microsoft Word] section of the WINWORD6.INI file. In Word 7.0, the format is stored in the Windows 95 Registry. You can set it through the `DateFormat` option of the `RegOptions` macro in the `MACROS7.DOT` template file that ships with Word. You should find the file in the Macros folder inside the Winword folder.

—*M. David Stone*



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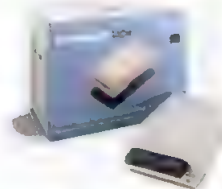
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SPREADSHEETS

Formatting Numbers Conditionally



In my spreadsheets, the input data vary considerably, and so do the results. Since it is bad style to publish results as 723.412 +/- 100.237 (for mean and standard deviation, for example), I have to reformat my huge tables manually. I know the optimal solution for this problem would be scientific notation. But neither my medical colleagues nor most editors of medical journals like it.

The VBA procedure in Figure 2 solves my problem.

P. KOEPPE
Berlin, Germany

PC MAGAZINE: You can create custom numeric formats in Excel that handle numbers differently depending on whether they're positive, negative, or zero. And Excel 97, due out in the fourth quarter of 1996 as part of Microsoft Office 97, will offer a broader set of conditional formatting options. In the new version, you'll be able to define up to three conditions, and you won't be limited to distinguishing positive, negative, or zero.

Unfortunately, Excel 97's conditional formatting feature still won't handle this reader's specific needs. Apart from the fact that more than three conditions are needed, the formatting options in Excel 97 are limited to those provided on the Font, Border, and Patterns tabs of the Format Cells dialog. In other words, you won't be able to apply numeric

```
Select Case cell.Value
Case Is > 100
    cell.NumberFormat = "#"
Case Is > 10
    cell.NumberFormat = "0.#"
Case Is > 1
    cell.NumberFormat = "0.##"
Case Is > 0.1
    cell.NumberFormat = "0.###"
Case Is > 0.01
    cell.NumberFormat = "0.####"
Case Is > 0.001
    cell.NumberFormat = "0.#####"
Case Is > 0.0001
    cell.NumberFormat = "#.#####"
Case Else
    cell.NumberFormat = "[red] general"
End Select
```

FIGURE 3: This Excel macro does the same thing as the one in Figure 2, except that it uses the more readable Case statements.

formats (or alignment formats or protection) conditionally.

To assign conditional numeric formats for conditions other than positive, negative, and zero, there's still no substitute for a macro like this one. If you don't like reading a long sequence of ElseIf statements, try the procedure in Figure 3, in which a Select Case structure replaces all of the ElseIf statements. —Craig Stinson

Color Me Blue

As a recent graduate from Lotus 1-2-3 to Excel 7.0, I miss the functionality that 1-2-3 provided for unprotected cells by coloring them blue. Is there a way to get at the built-in macros in Excel to add a line such as Selection.Font.ColorIndex=32?

DOUGLAS F. MACGREGOR
Hingham, Massachusetts

PC MAGAZINE: To re-create the automatic formatting of unprotected cells that 1-2-3 provides, you'd have to write a macro that would walk through each cell in a worksheet, check to see the cell's protection status, and then set a display format according to what it finds. Given the size of Excel's worksheet, this would be unbearably time-consuming. But your letter suggests that you already have the right idea: Just check the cells in the current selection, like this:

```
Sub FormatUnprotected()
    For Each Item In
        Selection.Cells
```

```
    If Item.Locked = False Then
        Item.Font.ColorIndex = 32
    End If
Next
End Sub
```

Select the block of cells you're working with, then execute the macro. To select the entire populated area of the current worksheet, press Ctrl-Home to get to A1. Then hold down the Shift key while you press Ctrl-End.—Craig Stinson

DATABASES

Setting the Paradox Runtime Refresh



During development of a multiuser application in Paradox 7.0 for Windows 95 and NT, I ran into a refresh problem. When using the Paradox 7.0 Runtime version, each user on the network would not see changes made by others until he or she changed records or pressed Ctrl-F3 (Refresh Data). Unfortunately, Paradox 7.0 Runtime doesn't let you set the refresh rate either interactively (Preferences | Database | Refresh rate) or via ObjectPal (dlgNetRefresh), even though both work fine in the nonruntime version.

The documentation didn't help, so I did some exploring in the Windows 95 and Windows NT 3.51 Registries and discovered that though there was a "RefreshRate" Registry key for Paradox 7.0, the key was missing from the Paradox Runtime section. I manually inserted the missing key and voilà! Everything worked exactly the same in the runtime version as it did in the nonruntime version.

The commands shown in the pushButton event code in Figure 4 carry out the modification to the Registry. Here, Seconds is the UI-Object holding the desired RefreshRate value (0 to 60 seconds, in this form), which has to be converted to a string. Note that Paradox Runtime has to be restarted after the Registry key is changed in order for the new setting to take effect.

Because the RefreshRate key is located in the HKEY_CURRENT_USER part of the Registry, I had to find a quick and simple way to make this change for all users. I also wanted to let every user freely set an independent refresh rate. After a few tests, I created a simple form that includes a trackbar to set the refresh rate (in seconds).

Keep in mind that this approach (using the RefreshRate Registry key) is not documented, so use it at your own risk. Also note that you will have to patch Paradox Runtime to the May version (5.9.96), or later, to avoid getting an OCX error.

LIONELLO FERRAZZINI
Rancate, Switzerland

```
Sub FormatCell()
    For Each cell In Selection
        If IsNumeric(cell.Value) Then
            If Abs(cell.Value) > 100 Then
                cell.NumberFormat = "#"
            ElseIf Abs(cell.Value) > 10 Then
                cell.NumberFormat = "0.#"
            ElseIf Abs(cell.Value) > 1 Then
                cell.NumberFormat = "0.##"
            ElseIf Abs(cell.Value) > 0.1 Then
                cell.NumberFormat = "0.###"
            ElseIf Abs(cell.Value) > 0.01 Then
                cell.NumberFormat = "0.####"
            ElseIf Abs(cell.Value) > 0.001 Then
                cell.NumberFormat = "0.#####"
            ElseIf Abs(cell.Value) > 0.0001 Then
                cell.NumberFormat = "#.#####"
            Else
                cell.NumberFormat = "[red] general"
            End If
        End If
    Next cell
End Sub
```

FIGURE 2: This VBA Excel macro uses ElseIf statements to produce highly customized number formatting.

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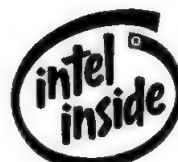


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```

;*****
; Code for the Form Page's open event
;*****

method open(var eventInfo Event)
var
    sRefreshRate string
    ar Array[] string
endvar
:
; If the key exists
:
if enumRegistryValueNames("Software\\Borland\\Paradox
➤Runtime\\7.0\\
    PDOXWIN\\Properties", regKeyCurrentUser, ar) then
:
; If the value name exists
:
if ar.contains("RefreshRate") then
    sRefreshRate = getRegistryValue( "Software\\Borland\\
    Paradox Runtime\\7.0\\PDOXWIN\\Properties",
    ➤"RefreshRate",
    regKeyCurrentUser)
endif
endif

; Use default if necessary
if isBlank(sRefreshRate) or
➤(isAssigned(sRefreshRate)=False) then

    sRefreshRate = "3"
endif

; Check for values outside range
Seconds = Longint(sRefreshRate)      ; Set the seconds
If (Seconds < 0) or (Seconds > 60) then
    Seconds = 3
Endif

Trackbar.pos = Seconds              ; Set the Trackbar position

endMethod

;*****
; Code for the Change button's pushButton event
;*****

method pushButton(var eventInfo Event)
if not setRegistryValue( "Software\\Borland\\Paradox
➤Runtime\\7.0\\
    PDOXWIN\\Properties", "RefreshRate", StrVal(Seconds),
    regKeyCurrentUser) then
    msgInfo("Problem...", "Error setting key")
    return
endif
MsgInfo("Info...", "Paradox will now be closed.
➤Please restart it.")
exit()
endMethod

```



FIGURE 4: You can use code like this in your Paradox 7.0 for Windows Runtime applications to modify the RefreshRate setting. The open event code reads the previous value from the Registry, and the pushButton event code stores the new value in the Registry.

PC MAGAZINE: When running the full retail version of Paradox 7.0 for Windows 95, you can set the refresh rate by choosing Edit | Preferences and selecting the Database tab. Although it isn't documented, the value you place in this dialog's Refresh rate setting is saved in the Registry under the "RefreshRate" value in the key

HKEY_CURRENT_USER\Software\Borland\
➤Paradox\7.0\Pdoxwin\Properties

This is also true in the Paradox Runtime version, where interactive adjustment of the refresh rate setting isn't allowed, although the RefreshRate value is stored under a key with a slightly different name: the Paradox text in the key is replaced with Paradox Runtime. Because the value is stored in the Registry, you can change the setting in your runtime applications by directly altering the Registry value in your ObjectPal code. The pushButton event code at the bottom of Figure 4 shows an example of this procedure.

Note that increasing the refresh frequency (by reducing the number of seconds between refreshes) results in increased traffic on the network, because Paradox retrieves any values that have changed. So you'll want to fine-tune the refresh setting to suit your network environment.

Mr. Ferrazzini's original form sets the RefreshRate to whatever value you choose via the Trackbar, with a default of 3 seconds. I modified the form to check and retrieve any existing RefreshRate setting from the Registry before letting you modify it via the Trackbar. The code required to make the change is shown in the open event code at the top of Figure 4.

First, the enumRegistryValueNames method is called to fill an array with the names of the values that exist under our specified key. The array is then searched to see if a RefreshRate value exists. If one does, the getRegistryValue method is used to obtain that value, which becomes the starting value for the Trackbar on the form. If no value exists or if the value is empty, the starting value for the Trackbar defaults to 3.

The code also checks for values outside the range of 0 to 60, since it's possible someone could edit the registry directly using Regedit and change RefreshRate to a value outside the range for this form.

Normally, you could omit the call to enumRegistryValueNames and the subsequent array search, because getRegistryValue is supposed to return an empty string—something you could test for—when it can't find a value. However, the current version of getRegistryValue has a bug that prevents it from reporting failure because of an empty

string. Hence the workaround.

The code shown in Figure 4 can be downloaded from PC Magazine Online (see the sidebar "Guide to Our Utilities" in this issue's Utilities column for downloading instructions). Look for the file named Setfrsh.fsl.
—Sal Ricciardi

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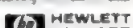
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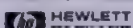
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TM 6030, P120, 11.5" Act., 1.0GB \$4049	5500CT, P133, 16MB, 2.0GB, 12.1" Act. \$4899
TM 6030, P133, 12.1" Act., 1.35GB \$4805	5500CT, P155, 16MB, 1.5GB, 12.1" Act. \$4899
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	800CT, P133, 16MB, 1.35GB, 10.4" Act. \$4070
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P100, 10.4" Act., 4X CD-ROM, 810MB \$2899
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P120, 11.3" Act., 4X CD-ROM, 810MB \$4899
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760SL, P120, 11.5" DS, 810MB \$3499	

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P120B, P120, 11.5" Act., 4X CD-ROM, 1.5GB \$3599	
P133B, P133, 11.8" Act., 4X CD-ROM, 1.5GB \$4530	E Series
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These IBM Aptiva models are all fully equipped with 8X CD-ROM drives, 3D graphics with 2MB RAM, full 16bit wavetable sound, tower-style speakers, microphone & a 28.8 data/fax modem. Plus, they are loaded with award-winning software to make everyday activities easier & more enjoyable.

IBM Aptiva Models

Model	CPU-MHz	Memory	L2 Cache	Hard Drive	Part #	Price
Aptiva C33	Pentium 133	16MB	Optional	1.6GB	2176C33	\$1899
Aptiva C55	Pentium 150	16MB	256K	2.0GB	2176C55	\$1999
Aptiva C65	Pentium 166	16MB	256K	2.0GB	2176C65	\$2299
Aptiva C67	Pentium 166	16MB	256K	2.5GB	2176C67	\$2349
Aptiva C73	Pentium 200	16MB	256K	2.5GB	2176C73	\$2649
Aptiva C77	Pentium 200	32MB	256K	3.2GB	2176C77	\$3049

Systems incl. mid-tower style case w/6 drive bays (3 open) 145W power supply. Slots: * total slots 2-PCI

IBM Monitors

Model	Tube Size	Visible Image Size	Part #	Price
G40	14"	13"	6542103	\$299
G41	14"	13"	6542301	\$349
G50	15"	13.4"	6543301	\$459
G70	17"	15.7"	6544403	\$819
G200	20"	18.4"	6545603	\$1499

*Monitors not included w/IBM Aptiva C Series. All IBM Monitors listed have 28mm dot pitch.



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IBM Monitors

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MM70	17"	15.7"	7097593

Both Monitors have 1280x1024 max. res., 28mm dot pitch, digital controls, 1 year warranty.

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With speakers and a microphone built into
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IBM Aptiva Models

Model	CPU-MHz	Memory	L2 Cache	Hard Drive	Part #	Price w/MM50	Price w/MM70
Aptiva S64	Pentium 166	16MB	256K	2.5GB	2159S64	\$2999	\$3299
Aptiva S66	Pentium 166	16MB	256K	3.2GB	2159S66	\$3149	\$3449
Aptiva S74	Pentium 200	16MB	256K	2.5GB	2159S74	\$3299	\$3599

Cardless mouse on select models only. Person you are calling must have the Internet Connection Phone software, plus sound card, speakers and microphone, but may use any Internet service provider. Some fees may apply. Aptiva system boards are covered for parts and labor during the first year, the next two years only system board parts are covered. Because some limitations may apply, check your sales manual or call 1-800-772-2227 to obtain a copy of IBM's limited warranty. *May differ from retail versions and may not include all documentation. IBM is a registered trademark and Aptiva, TheatreSound and Total Image 3D are trademarks of International Business Machines Corporation. All other company and/or product names are trademarks or registered trademarks of their respective companies. © 1996 IBM Corp. All rights reserved.

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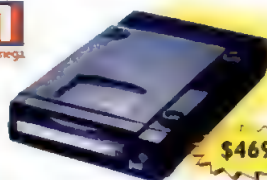
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- Built-in AC adapter
- Fast system performance with EDO RAM memory

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110CS	Pentium 100	11.3" Dual Scan	8/772MB	\$1999
110CT	Pentium 100	11.3" Active	8/772MB	2499

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—Wired, June 1996

Tecra 720

- Pentium 133MHz processor
- Built-in 28.8 fax modem
- Built-in 6X CD-ROM drive
- Optional Desktop capabilities

Model	Processor	Screen	RAM/HD	Price
720	Pentium 133	12.1" Active	16MB/1.1GB	\$5399



Tecra 720

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Tecra 730

- Pentium 150MHz processor
- 6X CD-ROM drive and audio
- Built-in 28.8 fax modem with speakerphone
- 1280 x 1024 external resolution

Model	Processor	Screen	RAM/HD	Price
730	Pentium 150	12.1" Active	16MB/2GB	\$6099



Tecra 730

Satellite Pro 420

Satellite Pro 420

- Pentium 100MHz processor
- Built-in 6X CD-ROM drive
- 11.3" Dual Scan & Active Matrix displays
- Built-in SoundBlaster Pro compatible audio

Model	Processor	Screen	RAM/HD	Price
420CDS	Pentium 100	11.3" Dual Scan	8/772MB	\$2499
420CDT	Pentium 100	11.3" Active	8MB/1.2GB	3299



Portégé 650

- 133MHz processor
- Built-in 28.8 fax modem
- Built-in SoundBlaster compatible audio
- Up to 11.3" Active Matrix display

Model	Processor	Screen	RAM/HD	Price
650CT	Pentium 133	11.3" Active	16MB/1.2GB	\$4499



Portégé 650

Tecra 500

- Pentium 120MHz processor
- Built-in 6X CD-ROM drive on 500CDE optional access on Tecra 500CS
- 16MB EDO RAM memory
- 12.1" Super VGA displays

Model	Processor	Screen	RAM/HD	Price
500CS	Pentium 120	12.1" Dual Scan	16MB/1.3GB	\$3699
500CDT	Pentium 120	12.1" Active	16MB/1.3GB	4699



Tecra 500

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Montego Notebook

- 100MHz Pentium processor
- 4.9 lb. weight
- EDO RAM memory
- Built-in 16-bit SoundBlaster compatible audio
- 28.8 PCMCIA fax/modem



Montego Notebook

Model	Processor	Screen	RAM/HD	Price
Montego	Pentium 100	10.4" Active	8MB/1GB	\$2499

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Milan Notebook

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- Up to 11.3" Super VGA displays
- Built-in 16-bit SoundBlaster audio
- Only 4.7" thick and 5.9 lbs



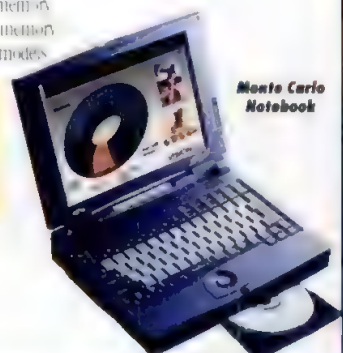
Milan Notebook

Model	Processor	Screen	RAM/HD	Price
Milan	Pentium 100	10.4" Dual Scan	8/810MB	\$1799*
Milan	Pentium 100	10.4" Active	8/810MB	2499*
Milan	Pentium 120	11.3" Active	8MB/1.2GB	3199
Milan	Pentium 120	11.3" Active	8MB/1.2GB	3349*
Milan	Pentium 133	11.3" Active	16MB/1.2GB	3699
Milan	Pentium 133	11.3" Active	16MB/1.2GB	3849*

* Features 28.8 PCMCIA fax/modem

Monte Carlo Notebook

- Up to 133MHz Pentium processors
- Built-in 6X CD-ROM drive
- 2MB video memory
- 16MB RAM memory on selected models



Monte Carlo Notebook

Model	Processor	Screen	RAM/HD	Price
Monte Carlo	Pentium 100	11.3" Active	8/810MB	\$2999
Monte Carlo	Pentium 100	11.3" Active	8/810MB	3149*
Monte Carlo	Pentium 120	11.3" Active	16MB/1GB	3699
Monte Carlo	Pentium 120	11.3" Active	16MB/1GB	3849*
Monte Carlo	Pentium 133	12.1" Active	16MB/1GB	4499
Monte Carlo	Pentium 133	12.1" Active	16MB/1GB	4649*

* Features 28.8 PCMCIA fax/modem

Milan and Monte Carlo models are available with Windows for Workgroups or Windows 95

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- 10.4" & 11.3" SVGA displays
- 16-bit sound, speakers and microphone
- Infrared port for wireless communications
- External floppy drive on 365XD

ThinkPad 365X & XD

Model	Processor	Screen	RAM/HD	Price
365X	Pentium 133	11.3" Dual Scan	8MB/1GB	\$2499
365X	Pentium 120	10.4" Active	8/810MB	2499
365XD	Pentium 120	10.4" Active	8/810MB	2699
365XD	Pentium 133	11.3" Active	8MB/1.4GB	3499

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- External floppy drive reduces weight
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- Infrared transceiver for wireless communication

Model	Processor	Screen	RAM/HD	Price
560	Pentium 100	11.3" Dual Scan	8/810MB	\$2699
560	Pentium 120	12.1" Active	8/810MB	3749
560	Pentium 133	12.1" Active	8MB/1.1GB	4199



ThinkPad 560

COMPAQ



Armada

Compaq Armada

Model	Processor	Screen	RAM/HD	Price
1120	Pentium 100	10.4" Dual Scan	8/810MB	\$1879
1120T	Pentium 100	10.4" Active	8/810MB	2199
4110	Pentium 100	11.3" Dual Scan	8/810MB	2479*
4110D	Pentium 100	11.3" Dual Scan	8/810MB	2899*†
4120	Pentium 120	11.3" Dual Scan	16MB/1.1GB	2999*
4120T	Pentium 120	11.8" Active	16/810MB	3699*
4130T	Pentium 133	11.8" Active	16MB/1.1GB	4399*

* Features built-in audio

† Includes 4X CD-ROM drive

LTE 5000 Series

Model	Processor	Screen	RAM/HD	Price
5150	Pentium 100	11.3" Dual Scan	8/810MB	\$2849
5250	Pentium 120	10.4" Active	16/810MB	3599
5280	Pentium 120	11.3" Active	16MB/1.35GB	4349
5200	Pentium 120	10.4" Active	8MB/1.35GB	4720
5300	Pentium 133	12.1" Active	16MB/1.35GB	4749
5380	Pentium 133	12.1" Active	16MB/2.2GB	6299



LTE 5000 Series

NEC



NEC Versa 6000

NEC Versa 6000

- Pentium 133MHz processor
- Built-in 6X CD-ROM drive
- 2MB video memory
- Built-in 28.8 cellular fax/modem

Call for the Top Rated Versa 2400

Model	Processor	Screen	RAM/HD	Price
6000	Pentium 133	11.3" Active	16MB/1.1GB	\$3799
6030H	Pentium 133	12.1" Active	16MB/1.3GB	4999
6030X	Pentium 133	12.1" Active	16MB/1.4GB	5399



NEC Versa 4200

- Pentium 100 and 133MHz processors
- SoundBlaster Pro compatible audio with 2 speakers
- With VersaBus II for optional 2nd battery or CD-ROM
- Full screen MPEG video, 4 audio ports and mic

Model	Processor	Screen	RAM/HD	Price
4200	Pentium 100	10.4" Active	8/810MB	\$2999
4230	Pentium 133	10.4" Active	8MB/1.0GB	3899

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Extensa 600CD

Extensa 600

- 6X CD-ROM drive
- 16-bit audio and speakers
- 32-bit PCI bus
- Windows 95 preinstalled

Model	Processor	Screen	RAM/HD	Price
600CD	Pentium 120	12" Dual Scan	8/810MB	\$2249

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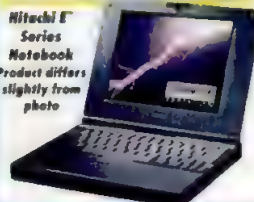
- Up to 150MHz Pentium processors*
- Up to 12.1" Super VGA Active Matrix displays
- PCMCIA 28.8 fax/modem
- 2MB video memory

Model	Processor	Screen	RAM/HD	Price
6020	Pentium 120	11.3" Active	8MB/1.08GB	\$4099
6030	Pentium 133	12.1" Active	16MB/1.35GB	4889
6050	Pentium 50	12" Active	16MB/1.35GB	5379

TravelMate 6000



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Hitachi E Series Notebook
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Hitachi E™ Series

- PCMCIA 28.8 cellular ready fax/modem
- 11.3" Super VGA displays
- Only 1.6" thick and 5.8 lbs

Model	Processor	Screen	RAM/HD	Price
E100D	Pentium 100	11.3" Dual Scan	16/810MB	\$1999
E100T	Pentium 133	11.3" Active	16/810MB	2999

NEW MODELS!

Hitachi M™ Series

- Integrated 10 Base-T Ethernet card
- Built-in 28.8 data/fax/modem
- SoundBlaster Pro compatible audio
- Built-in 4X or 6X CD-ROM drives

Model	Processor	Screen	RAM/HD	Price
M100D	Pentium 100	11.3" Dual Scan	8/810MB	\$2099
M100D	Pentium 100	11.3" Dual Scan	8/810MB	2099*
M120T	Pentium 120	11.8" Active	16MB/1GB	3699
M120T	Pentium 120	11.8" Active	16MB/1GB	3699*
M133T	Pentium 133	11.8" Active	16MB/1GB	4399
M133T	Pentium 133	11.8" Active	16MB/1GB	4399*

* Features Windows for Workgroups

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- 6X CD-ROM drive and 16-bit audio chipset
- 11.3" and 12.1" 800x600 displays
- 24MB of RAM memory on selected models
- Built-in 28.8 Kbps fax modem on selected models

Model	Processor	Display	RAM	Price
A40	Pentium 120	11.3" Dual Scan	16MB/1.0GB	\$2499
A40	Pentium 120	12.1" Active	16MB/1.0GB	3199
P50	Pentium 133	12.1" Active	24MB/1.0GB	3979
P50	Pentium 133	12.1" Active	24MB/2.1GB	4349

AST Ascentia J

- Integrated 14.4 data fax modem and audio on selected models
- PCs included with 256K Level 2 cache (Pentium 100, 113)
- 10.4" XGA or SVGA 800x600 resolution
- Dual Scan and Active Matrix displays

Model	Processor	Display	RAM	Price
J10	Pentium 75	10.4" Dual Scan	8/500MB	\$1849
J20	Pentium 100	11.3" Dual Scan	8/500MB	1749
J10	Pentium 75	10.4" Dual Scan	8/800MB	1999
J30	Pentium 100	10.4" Dual Scan	8/800MB	2049
J30	Pentium 100	10.4" Active Matrix	8/800MB	2269
J50	Pentium 133	10.4" Active Matrix	8/800MB	2649



NEW MODEL!

Ascentia J

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Sharp 3000&9000

- Up to 133MHz Pentium processor
- Built-in 4X or 6X CD-ROM drives on selected models
- 32-bit PCI Local bus graphics
- SoundBlaster compatible audio on all models except 9030



Sharp PC Series

Sharp 3000&9000

Model	Processor	Display	RAM	Price
3030	Pentium 100	11.3" Dual Scan	8/515MB	\$1599
3070	Pentium 100	11.3" Dual Scan	16MB/1GB	1899
3040	Pentium 100	12.1" Dual Scan	8MB/1.1GB	1999
9000	Pentium 100	11.3" Dual Scan	8MB/1GB	2299†
9020	Pentium 120	12.1" Dual Scan	16MB/1.1GB	2899†
9030	Pentium 120	11.3" Active (SHA)	8MB/1.1GB	2949†
9050	Pentium 133	11.3" Active (SHA)	16MB/1.1GB	3499†
9070	Pentium 133	12.1" Active (SHA)	16MB/1GB	4199†
9080	Pentium 133	12.1" Active (SHA)	16MB/1.3GB	4999†

* Includes 4X CD-ROM drive † Includes 6X CD-ROM drive

Sharp WideNote

- Only 4.2 lbs. and 1.57" thick
- Built-in 16-bit sound speakers and mic phone
- Built-in 28.8 Kbps fax modem
- 64-bit PCI graphics with 2MB 4-level memory



Sharp WideNote

W100D	Pentium 133	11.2" Wide Dual Scan	16MB/1.1GB	\$2999
W100T	Pentium 133	11.2" Wide Active	16MB/1.1GB	3499

olivetti
personal computers

Olivetti Echos

- Up to 133MHz Pentium processors
- Built-in 6X CD-ROM drives
- Giant 1.3GB removable hard drives
- Up to 11.8" Super VGA displays
- 16-bit stereo audio, speakers and microphone
- Optional docking station available

Model	Processor	Display	RAM	Price
Echos	Pentium 100	11.3" Dual Scan	8MB/1.3GB	\$1999
Echos	Pentium 100	10.4" Active	8MB/1.3GB	2599
Echos	Pentium 120	11.3" Active	8MB/1.3GB	2999
Echos	Pentium 133	11.8" Active	16MB/1.3GB	3799

UP TO 133MHz PENTIUM



Prices starting at \$1999

Olivetti Echos Series Notebook

digital



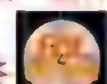
Digital HiNote VP

Digital HiNote VP

Model	Processor	Display	RAM	Price
HiNote VP	Pentium 100	11.3" Dual Scan	8/810MB	\$1999
HiNote VP	Pentium 120	11.3" Dual Scan	8MB/1.0GB	2499*
HiNote VP	Pentium 120	11.3" Active	8MB/1GB	2779
HiNote VP	Pentium 133	11.3" Active	8MB/1.0GB	2949*
HiNote VP	Pentium 133	11.3" Active	8MB/1.4GB	3599*

* Features 6X CD-ROM drive

Call for Special \$1699 Price on Dual Scan 120MHz HiNote VP



On selected models

Digital HiNote Ultra II

- Up to 150MHz Pentium processors
- Only 1.2" thick and 4.0 lbs
- 11.3" Super VGA Active Matrix displays
- 16MB of RAM memory

Model	Processor	Display	RAM	Price
Ultra II	Pentium 133	11.3" Active	16MB/1.35GB	\$4499
Ultra II	Pentium 133	11.3" Active	16MB/1.35GB	4499*
Ultra II	Pentium 133	11.3" Active	16MB/1.35GB	4699†
Ultra II	Pentium 150	11.3" Active	16MB/1.44GB	4799
Ultra II	Pentium 150	11.3" Active	16MB/1.44GB	4799*
Ultra II	Pentium 150	11.3" Active	16MB/1.44GB	4999†

Digital Ultra II with external Floppy Disk



* Features Windows for Workgroups
† Features Windows NT
Additional models available.
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HP OmniBook 800 Notebook PC

HP OmniBook 800

- Up to 133MHz Pentium processors
- Instant On with up to 45 minutes standby life
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- Optional docking system available

Model	Processor	Display	RAM	Price
800CS	Pentium 100	10" Dual Scan	16/810MB	\$3329
800CT	Pentium 133	10.4" Active	16MB/1.4GB	4759

NEW MODEL!

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- PCI Local bus video 1MB video memory
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- Optional 4X or 6X CD-ROM available

Model	Processor	Display	RAM	Price
5500CTS	Pentium 120	11.3" Dual Scan	16MB/1.35GB	\$3879
5500CTS	Pentium 120	10.4" Active	16MB/1.35GB	4099
5500CTS	Pentium 120	12.1" Active	16MB/1.35GB	4559
5500CTS	Pentium 133	12.1" Active	16MB/1.35GB	4739
5500CTS	Pentium 133	12.1" Active	16MB/2GB	5119

HP OmniBook 5500 Notebook PC



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IBM Aptiva

Model	Processor	RAM/HD	CD	Price
C23	Pentium 120	16MB/1.6GB	8X	\$1799
C33	Pentium 133	16MB/1.6GB	8X	1699
C65	Pentium 166	16MB/2.0GB	8X	2299
C73	Pentium 200	16MB/2.5GB	8X	2649
C77	Pentium 200	32MB/3.2GB	8X	2949
S64	Pentium 166	16MB/2.5GB	8X	2499
S66	Pentium 166	16MB/3.2GB	8X	2649
S74	Pentium 200	16MB/2.5GB	8X	2799
S78	Pentium 200	16MB/3.5GB	8X	3099

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UP TO 200MHz
PENTIUM



IBM Aptiva Multimedia Minitower Computer

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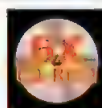
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- Up to 2.5GB hard drives

Model	Processor	RAM/HD	CD	Price
4704	Pentium 133	16MB/1.6GB	6X	\$1699
4712	Pentium 166	24MB/2.5GB	6X	2199

Monitors priced separately



UP TO 166MHz

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UP TO 200MHz
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Model	Processor	RAM/HD	CD	Price
7130	Pentium 133	16MB/1.6GB	8X	\$1799
7160	Pentium 166	16MB/2.1GB	8X	2099
7200	Pentium 200	16MB/3.0GB	8X	2799

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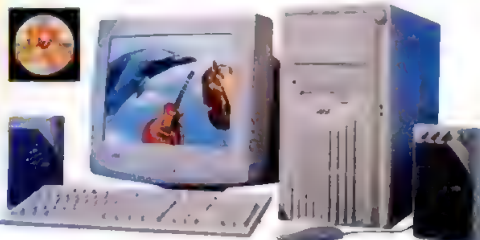


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Advantage Multimedia

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Advantage Adventure Multimedia

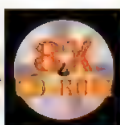
- Up to 200MHz Pentium processors
- 8X CD-ROM drive
- MPEG Level I playback support
- 33.6 data fax voice modem on selected models
- Integrated 3-D surround sound
- Video conferencing & tuner card on 9312 model

Model	Processor	RAM/HD	CD	Price
9304	Pentium 133	24MB/1.6GB	8X	\$1699*
9308	Pentium 166	24MB/2.5GB	8X	2199*
9310	Pentium 166	24MB/2.5GB	8X	2499*
9312	Pentium 166	24MB/2.5GB	8X	2599*
9315	Pentium 166	32MB/2.5GB	8X	2699*
9314	Pentium 200	24MB/4.0GB	8X	2699
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* Features a 33.6 data/fax/voice modem
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Model	Processor	RAM/HD	CD	Price
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9620	Pentium 133	16MB/1.6GB	8X	1799
9624	Pentium 133	16MB/2.0GB	8X	1999
9622	Pentium 166	16MB/2.5GB	8X	2199
9628	Pentium 166	32MB/3.2GB	8X	2699
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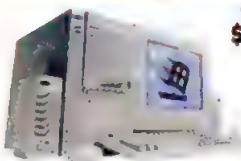
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*Some software is pre-installed.
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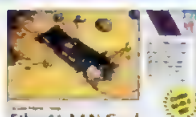
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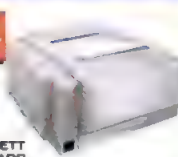


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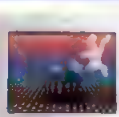


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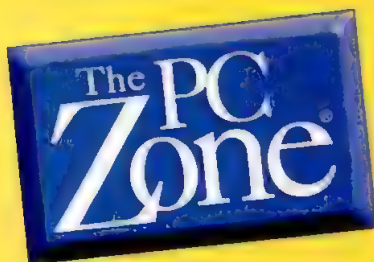


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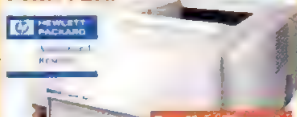
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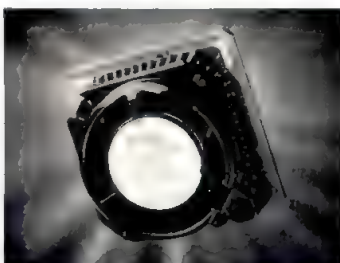
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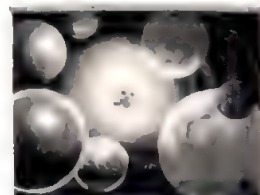
Ultra 40 - 14" monitor 1024 x 768, .28mm.....\$219

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- Microphone
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US ROBOTICS

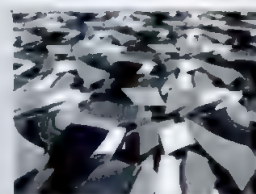
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DX700T

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- Microsoft Publisher
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- Microsoft Money
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* PowerMate Pro 2200	200MHz Pentium® Pro processor	3GB/1X	32MB RAM	\$3,649

* Pro 2200 includes Matrox Video Subsystem and PCI Ultra Wide SCSI Hard Drive.

* Monitors not included in price, model shown is Ready 9625.

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Model	Processor	Screen	HD/CD-ROM	Price
PC-6220-0700	100MHz Intel Pentium® processor	11.3 SVGA	1GB/4X	\$3,999
PC-6220-0700	133MHz Intel Pentium processor	11.3 SVGA	1GB/4X	\$4,999
PC-6220-0750	133MHz Intel Pentium processor	12.1 SVGA	1.0GB/4X	\$4,999
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- Removable Lithium Ion Battery
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Model	Processor	Screen	HD/CD-ROM	Price
PC-4400-7102	100MHz Intel Pentium processor	10.4" Hi-Res TFT	610MB	\$2,999
PC-4400-7102	133MHz Intel Pentium processor	10.4" Hi-Res TFT	1GB/4X	\$3,999

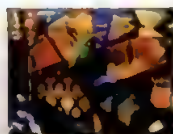
NEC Versa 2400 Series

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- 1 year UltraCare Warranty

Model	Processor	HD/CD-ROM	MEMORY	Price
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PC-6500-4102	133MHz Intel Pentium processor	1.0GB/4X	8MB	\$2,999
PC-6500-4103	133MHz Intel Pentium processor	1.0GB/4X	16MB	\$3,999

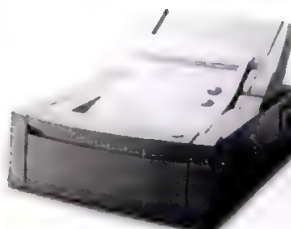
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Model	Data Transfer Rate	Type	Access Time	Price
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Multispin IV (internal)	1200 KB/sec	IDE	140ms	\$149
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Multispin IX (external)	1200 KB/sec	SCSI	140ms	\$499



THE NEC MULTISYNC®
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Multisync C500	15" diagonal flat square CRT	.28mm	1024 x 768 M	\$ 399
Multisync XV5+	15" diagonal flat square CRT	.28mm	1280 x 1024 M	\$ 499
Multisync M500	15" diagonal flat square CRT	.28mm	1280 x 1024 M	\$ 499
Multisync XV7+	17" diagonal flat square CRT	.28mm	1280 x 1024 M	\$ 624
Multisync M700	17" diagonal flat square CRT	.28mm	1280 x 1024 M	\$ 779
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Advantage Pro 486/33 SX/25 Bravo LC

4MB MD.....\$59

16MB MD.....\$179

Advantage Pro 486/33 SX/25 Bravo LC

4MB MD.....\$59

16MB MD.....\$179

Advantage Pro 486/33 SX/25 Bravo LC

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Advantage Pro 486/33 SX/25 Bravo LC

4MB MD.....\$59

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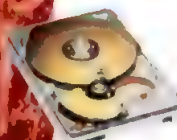


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Capacity*	Model	Access	Cache	RPM	Max. Trans. Rate	Form/Hgt.	Interface	Mfr.'s Wnty.	Product Code	Price
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1280MB	Caviar	10ms	128	5,200	16.6MB/sec	3.5" 1"H	Enhanced IDE	3 Year	WD21200AB	199.99
1620MB	Caviar	10ms	128	5,200	16.6MB/sec	3.5" 1"H	Enhanced IDE	3 Year	WD21600AB**	239.99
2113MB	Caviar	12ms	128	5,200	16.6MB/sec	3.5" 1"H	Enhanced IDE	3 Year	WD32100AB	269.99
2559MB	Caviar	12ms	128	5,200	16.6MB/sec	3.5" 1"H	Enhanced IDE	3 Year	WD32500AB	299.99
3166MB	Caviar	12ms	128	5,200	16.6MB/sec	3.5" 1"H	Enhanced IDE	3 Year	WD33100AB**	379.99
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540MB	Notebook	13ms	128	4,500	13.3MB/sec	2.5" 12.7mm	IDE	3 Year	WDAL2540**	\$159.99
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810MB	Marathon	16ms	120	4,500	16.6MB/sec	2.5" 19.15mm	Fast ATA-2	3 Year	ST9816AG	\$349.99
1650MB	Marathon si	14ms	120	4,500	16.6MB/sec	2.5" 12.7mm	Fast ATA-2	3 Year	ST1350AG	429.99
Desktop PC Products										
1082MB	ST31081A	14ms	64	3,600	16.6MB/sec	3.5" 1"H	Fast-ATA-2	3 Year	ST31081AB**	\$169.99
1275MB	ST31276A	12.5ms	64	4,500	16.6MB/sec	3.5" 1"H	Fast-ATA-2	3 Year	ST31276AB	185.99
1700MB	Medalist 1720	12ms	128	4,500	16.6MB/sec	3.5" 1.02"H	Fast-ATA-2	3 Year	ST31720AB	219.99
2113MB	Medalist 2140	10ms	128	5,400	16.6MB/sec	3.5" 1.02"H	Fast-ATA-2	3 Year	ST32140AB	249.99
2560MB	Medalist Pro	11ms	128	5,400	16.6MB/sec	3.5" 1.02"H	Fast-ATA-2	3 Year	ST31720AB	315.99
2.5" Hard Drives										
810MB	Slimline	13ms	128	4,200	13.3MB/sec	2.5" 12.7MM	Fast-ATA	1 Year	MK1926FCV	\$299.99
1300MB	Slimline	13ms	128	4,200	13.3MB/sec	2.5" 12.7MM	Fast-ATA	1 Year	MK1301MAV	449.99
1300MB	Notebook	13ms	128	4,200	13.3MB/sec	2.5" 19MM	Fast-ATA	1 Year	MK2720FC	459.99
2100MB	Notebook	13ms	128	4,200	13.3MB/sec	2.5" 19MM	Fast-ATA	1 Year	MK2101MAN	599.99
1090MB	Winchester	12ms	64	4,500	16.6MB/sec	3.5" 1"H	Fast-ATA-2	3 Year	FJ1614AB	\$175.99
850MB	Trailblazer	14ms	128	4,500	16.6MB/sec	3.5" 1"H	Fast ATA-2	3 Year	QUTR850AB	\$169.99
1708MB	Sirocco	11ms	128	4,500	16.6MB/sec	3.5" 1"H	Fast ATA-2	3 Year	QUSR1708AB	225.99
2550MB	Sirocco	11ms	128	4,500	16.6MB/sec	3.5" 1"H	Fast ATA-2	3 Year	QUSR2550AB	319.99
2168MB	Fireball™	10.5ms	128	4,500	16.6MB/sec	3.5" 1" H	Fast-ATA-2	3 Year	QUTM2110AB	279.99
3254MB	Fireball™	10.5ms	128	4,500	16.6MB/sec	3.5" 1" H	Fast-ATA-2	3 Year	QUTM3200AB	359.99
1336MB	Durango	11ms	64	4,500	16.6MB/sec	3.5" 1"H	Enhanced IDE	3 Year	MX71336AB	\$209.99
1670MB	Durango	12ms	256	4,500	16.6MB/sec	3.5" 1"H	Enhanced IDE	3 Year	MX71626AB	235.99
2004MB	Durango	11ms	128	4,500	16.6MB/sec	3.5" 1"H	Enhanced IDE	3 Year	MX72004AB	285.99
1700MB	Deskstar	12ms	128	4,500	16.6MB/sec	3.5" 1"H	Fast-ATA-2	3 Year	IB06H8724	\$299.99

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1080MB	Medalist	12.5ms	128	5,400	10MB/sec	3.5" HH	Fast SCSI-2 A/V	3 Year	ST51080NB	\$249.99
1050MB	Hawk 2XL	9ms	512	5,411	20MB/sec	3.5" 1"H	Ultra SCSI	3 Year	ST31055NB	349.99
1050MB	Hawk 2XL	9ms	512	5,411	40MB/sec	3.5" 1"H	Ultra Wide SCSI	3 Year	ST31055WB	389.99
2149MB	Hawk 2XL	9ms	512	5,400	20MB/sec	3.5" 1"H	Ultra SCSI	5 Year	ST32155NB	549.99
2149MB	Hawk 2XL	9ms	512	5,400	40MB/sec	3.5" 1"H	Ultra Wide SCSI	5 Year	ST32155WB	579.99
4294MB	Hawk 4	9ms	512	5,411	10MB/sec	3.5" HH	Fast SCSI-2 A/V	5 Year	ST15230NB	949.99
4294MB	Hawk 4	9ms	512	5,411	20MB/sec	3.5" HH	Fast Wide SCSI-2 A/V	5 Year	ST15230WB	989.99
50 Pin Standard and 68 Pin Wide Performance Drives										
2147MB	Barracuda 2LP	8ms	512	7,200	10MB/sec	3.5" 1"H	Fast SCSI-2 A/V	5 Year	ST32550NB	\$749.99
2147MB	Barracuda 2LP	8ms	512	7,200	20MB/sec	3.5" 1"H	Fast Wide SCSI-2 A/V	5 Year	ST32550WB	799.99
2150MB	Barracuda 4LP	8ms	512	7,200	20MB/sec	3.5" 1"H	Ultra SCSI	5 Year	ST32171NB	799.99
2150MB	Barracuda 4LP	8ms	512	7,200	40MB/sec	3.5" 1"H	Ultra Wide SCSI	5 Year	ST32171WB	849.99
4294MB	Barracuda 4	8ms	1,024	7,200	10MB/sec	3.5" HH	Fast SCSI-2 A/V	5 Year	ST15150NB	1,049.99
4294MB	Barracuda 4	8ms	1,024	7,200	20MB/sec	3.5" HH	Fast Wide SCSI-2 A/V	5 Year	ST15150WB	1,104.99
4350MB	Barracuda 4LP	8ms	512	7,200	20MB/sec	3.5" 1"H	Ultra SCSI	5 Year	ST34371NB	1,149.99
2170MB	Enterprise	8ms	512	7,200	20MB/sec	3.5" 1"H	Ultra SCSI	5 Year	WD2170SB	\$759.99
2170MB	Enterprise	8ms	512	7,200	40MB/sec	3.5" 1"H	Ultra Wide SCSI	5 Year	WD2170WB	799.99
4360MB	Enterprise	8ms	512	7,200	20MB/sec	3.5" 1"H	Ultra SCSI	5 Year	WD4360SB	1,129.99
4360MB	Enterprise	8ms	512	7,200	40MB/sec	3.5" 1"H	Ultra Wide SCSI	5 Year	WD4360WB	1,179.99
4360MB	Enterprise	8ms	512	7,200	40MB/sec	3.5" 1"H	Ultra Wide SCSI-3/SCA	5 Year	WD4360WCB	1,199.99
2100MB	Aries	8.5ms	512	5,400	10MB/sec	3.5" 1"H	Fast SCSI-2	5 Year	MC4421SB	\$429.99
2100MB	Taurus	8.9ms	512	7,200	10MB/sec	3.5" 1"H	Fast SCSI-2	5 Year	MC4421SB	549.99
4300MB	Capricorn	8.5ms	512	7,200	10MB/sec	3.5" HH	Fast SCSI-2	5 Year	MC3243SB	859.99
68 Pin Wide SCSI Drives										
2100MB	Taurus	8.5ms	512	7,200	20MB/sec	3.5" 1"H	Fast Wide SCSI-2 A/V	5 Year	MC4221AVWB	\$739.99
4300MB	Capricorn	8.5ms	512	7,200	20MB/sec	3.5" HH	Fast Wide SCSI-2 A/V	5 Year	MC3243AVWB	1,029.99
9100MB	Scorpio	12ms	512	5,400	20MB/sec	3.5" FH	Fast Wide SCSI-2 A/V	5 Year	MC1991AVWB	1,899.99
9100MB	Tomahawk	8ms	512	7,200	20MB/sec	3.5" HH	Ultra SCSI	5 Year	MC3391NSB	1,999.99
1280MB	Tempest	10.5ms	128	4,500	20MB/sec	3.5" 1"H	Ultra SCSI	3 Year	QUTM1280SB	\$319.99
2100MB	Tempest	10.5ms	128	4,500	20MB/sec	3.5" 1"H	Ultra SCSI	3 Year	QUTM2100SB	359.99
3200MB	Tempest	10.5ms	128	4,500	20MB/sec	3.5" 1"H	Ultra SCSI	3 Year	QUTM3200SB	499.99
2150MB	Atlas	8ms	1,024	7,200	20MB/sec	3.5" 1"H	Fast Wide SCSI-2	5 Year	QUXP3125WB	679.99
4300MB	Atlas	8ms	1,024	7,200	20MB/sec	3.5" HH	Fast Wide SCSI-2	5 Year	QUXP3430WB	949.99

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Fast EtherLink XL PCI, 5 pack	NW3C905TX5	634.99
EtherLink XL PCI	NW3C900TPO	114.99
EtherLink XL PCI, 5 pack	NW3C900TP5	549.99
EtherLink XL Combo	NW3C900COM	135.99
EtherLink XL Combo, 5 pack	NW3C900C05	634.99
OfficeConnect Family		
OfficeConnect Hub, 8-port TP unmanaged TPC	NW3C16701	\$189.99
OfficeConnect Hub, 8-port TP TPM	NW3C16710	509.99
OfficeConnect Hub, 8-port TP unmanaged TPC	NW3C16700	149.99
OfficeConnect Remote 510, BNC, 10 Base 2, RJ-45, TP	NW3C410015	799.99
OfficeConnect Hub 8/TP100	NW3C16720	899.99
OfficeConnect Remote 520, BNC, 10 Base 2, RJ-45, TP, RJ-11	NW3C410020	945.99
OfficeConnect Remote 530, BNC, 10 Base 2, RJ-45, TP, DB-25, RJ-11	NW3C410025	1,099.99
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Impact IQ	IM3C882EXT	\$349.99
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IBM PC 320 Server Models

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PC 320 RAID PCI	166MHz Pentium®	32MB/0GB	4X	IBA8640EE1	8,329.99

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540MB HDD "Track Stick" 501700-301	1,699.99
AST Ascentia J20 P100 11.3" DSTN 840MB RAM	
810MB HDD "Track Stick" 501700-401	1,799.99
AST Ascentia J30 P100 10.4" DSTN 840MB RAM	
800MB-R HDD "Track Stick" 501945-401	1,899.99
AST Ascentia J30 P100 10.4" TFT 840MB RAM	
800MB-R HDD "Track Stick" 501945-401	2,339.99
AST Ascentia J50 P133 10.4" TFT 840MB RAM	
800MB-R HDD "Track Stick" 501947-401	2,669.99
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800MB-R HDD 4X CD Touch Pad 501996-301	2,429.99
AST Ascentia P30 P100 11.3" DSTN 840MB RAM	
1.2GB-R HDD 4X CD Touch Pad 501996-401	2,619.99
AST Ascentia P40 P120 11.3" TFT 16MB RAM	
1GB-R HDD Touch Pad 502000-301	CALL
AST Ascentia P40 P120 11.3" TFT 24MB RAM	
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AST Ascentia P50 P133 11.3" TFT 840MB RAM	
800MB-R HDD 4X CD Touch Pad 501997-301	3,565.99
AST Ascentia P50 P133 11.3" TFT 840MB RAM	
1.2GB-R HDD 4X CD Touch Pad 501997-401	3,755.99
AST Ascentia P50 P133 12.1" TFT 24MB RAM	
1GB-R HDD Touch Pad 502001-301	3,989.99
AST Ascentia P50 P133 12.1" TFT 24MB RAM	
2.1GB-R HDD Touch Pad 502001-401	4,359.99
IBM ThinkPad 365ED 5186 10.4" DSTN 840MB RAM	
540MB HDD 4X CD 67252500	1,999.99
IBM ThinkPad 365XD P100 10.4" DSTN 840MB RAM	
540MB HDD 4X CD TrackPoint III 67252503	2,299.99
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1.0GB HDD 4X CD TrackPoint III 6725250F	2,949.99
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810MB HDD Opt. CD TrackPoint III 6725250B	4,549.99
IBM ThinkPad 365XD P120 10.4" TFT 840MB RAM	
810MB HDD 4X CD TrackPoint III 6725250B	4,549.99
IBM ThinkPad 365X P133 11.3" TFT 840MB RAM	
1.0GB HDD Opt. CD TrackPoint III 6725250B	4,549.99
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1.35GB HDD 6X CD TrackPoint III 6725250B	4,549.99
IBM ThinkPad 760EL P100 11.3" DSTN 872MB RAM	
810MB HDD TrackPoint III 67254700	3,199.99
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810MB-R HDD TrackPoint III 67254700	4,499.99
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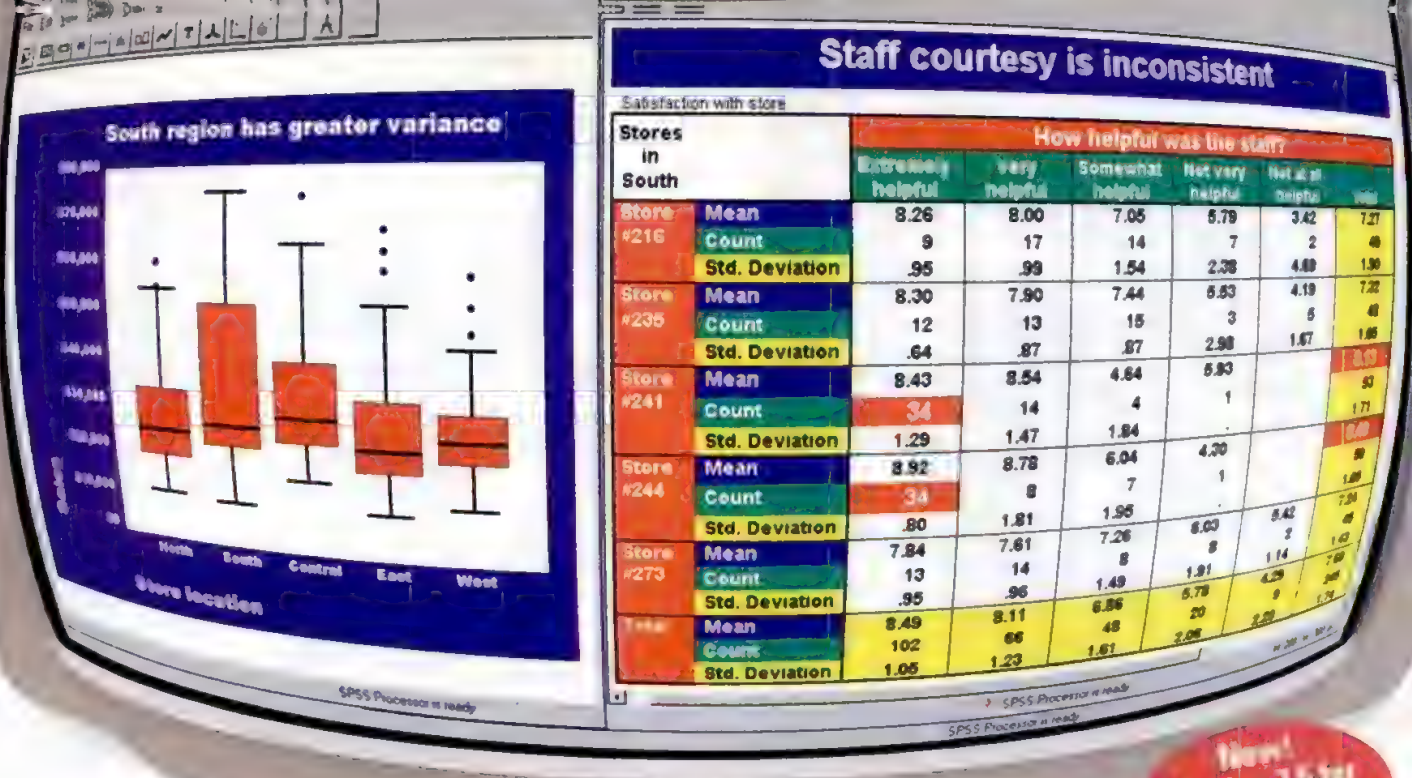
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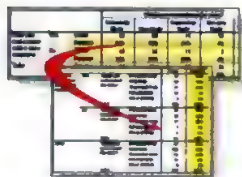
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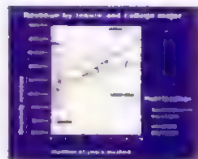
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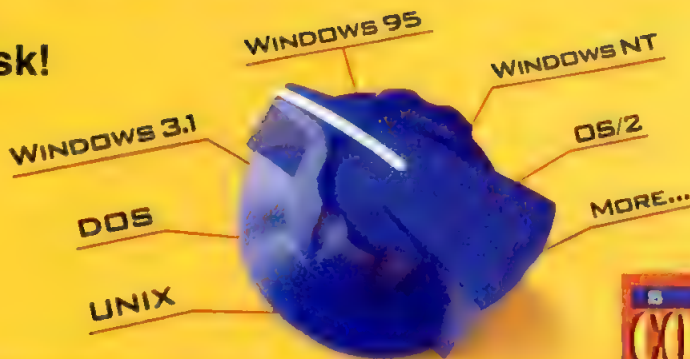
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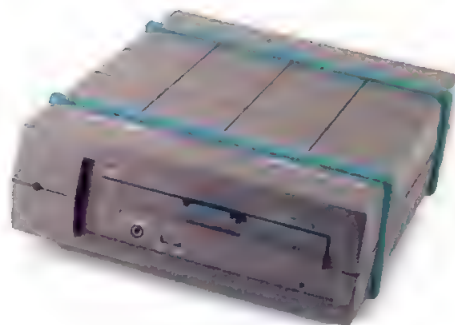
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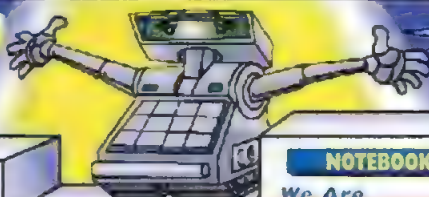
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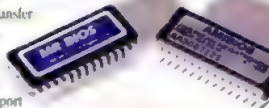
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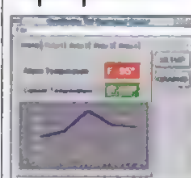
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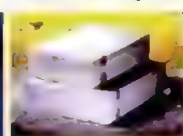
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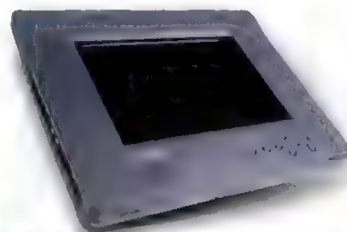
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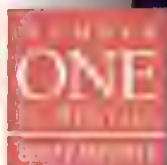
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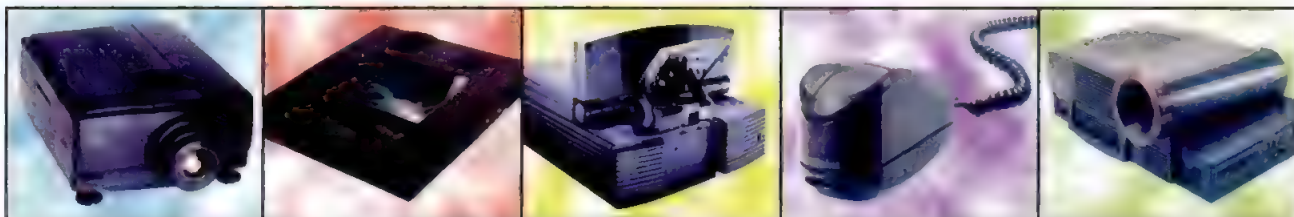
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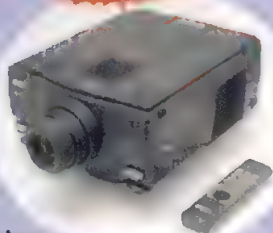
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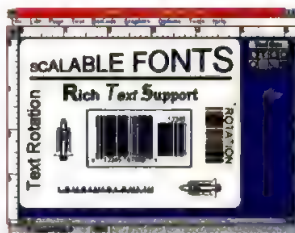
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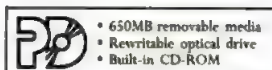
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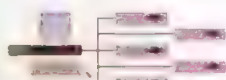
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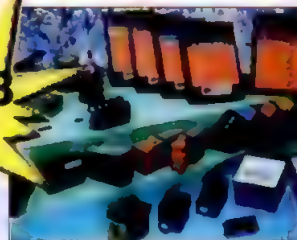
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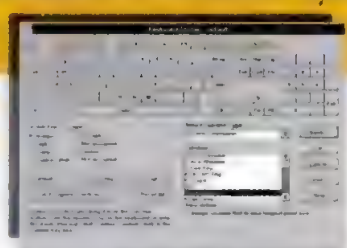
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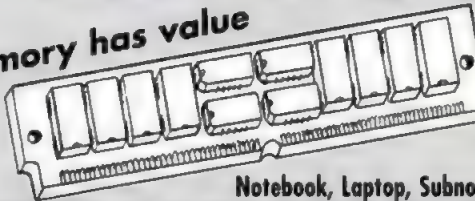
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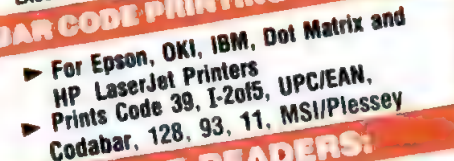
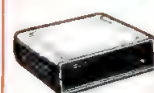
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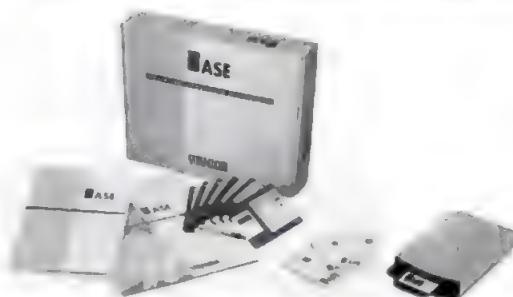
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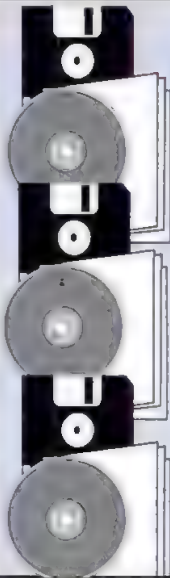
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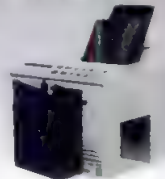
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At Home

A SPECIAL REPORT ON PRODUCTS FOR THE PERSONAL MADE-TO-ORDER INVESTOR

PERSONAL INVESTMENT SOFTWARE

Investment 101

By Kathy Yakal

Take the stock market's complexities and risks and add the problems that come with using a PC and on-line services: You might expect a recipe for digital disaster. Instead, when we looked at this year's crop of personal investment software packages, we found a group of well-tuned programs carefully crafted to help you get the information you need to track and evaluate your holdings. We rated each package for power and ease in four categories: setup, information gathering, analysis, and portfolio management.

In terms of pricing and features, investment software is all over the board. We looked at seven Windows-based products that ran the gamut: Charles Schwab &

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Co.'s e.Schwab Online Investing (free), Micro Quest's Inside Track (\$49.95 or \$79.95, depending on the configuration), Intuit's Investor Insight (free), Equis International's MetaStock (\$349), Reality Online's Reuters Money Network (\$24.95), Telescan Investor's Platform (\$199 or \$395, depending on the configuration), and Window on WallStreet Professional Investor 5.0 (\$295).

Each product varies as to additional charges for online access to stock quotes and news items as well as disk-based updates. Remember these costs when you consider managing your finances electronically.

Most of the packages, we found, did not do a very good job of providing no-brainer setup tools for users new to investing, online services, or both. Investor Insight and e.Schwab did the best in terms of walking users through the setup process.

All of the products offer at least one way to obtain securities news and quotes, through either regular CD-ROM updates or an online service. Window on WallStreet offers both. Its quarterly CD-ROM lists about 70 fundamental data points for approximately 8,000 publicly traded companies (for only \$15), and the package's online service options are generous. In addition, many of the products automate such data gathering, letting you schedule times for downloading and alerting you via computer or pager when a specified price or other trigger point has been reached.

Once you've found out how XYZ Co.'s stock has been traded for the last five years, what do you do with that information? Instead of guessing or paying a broker for a recommendation, you can use the analysis capabilities of your investment software. While some of these products offer only a few cursory reports and charts, others, particularly MetaStock and Window on WallStreet, offer extensive analysis features. But while these tools can help make your investment activity more profitable, they also require that you know a good deal about the stock market and its workings. So should you decide to take control of your investment decisions, possibly putting substantial sums at risk, be advised that you'll have some learning to do. You may have to consult resources other than the software and the manual to do so adequately.

Most of these programs also let you create and track portfolios with past and present information about your investments, either within the program itself (as with Reuters Money Network) or through a link to an existing portfolio (Window on WallStreet).

Even the best stockbrokers are not always right about the orders they issue. So you really can't expect personal investment software to consistently make you a bundle with little or no risk. But after looking at these seven packages, we're convinced that a good investment package can help you maximize your gains and minimize your losses when you take on Wall Street with your PC.

Our Contributors: KATHY YAKAL, a freelance author specializing in financial software, is a frequent contributor to *PC Magazine*. WAYNE KAWAMOTO is a frequent contributor to *PC Magazine*. SEBASTIAN RUPLEY is a senior editor at the magazine, and MICHAEL E. RYAN was the associate editor in charge of this story.

Charles Schwab & Co. Inc.

e.Schwab Online Investing

Although it is free and you can apply it to general personal investments, e.Schwab Online Investing is really useful only with Charles Schwab & Co.'s online brokerage services. Using this software, you can perform online trades via a Schwab account, update your portfolio, and create a few reports and charts. But if you want to do more, you will need to fork over more money to use e.Schwab with Reuters Money Network (see the separate review later in this story).

We found e.Schwab easy to install, thanks in part to the helpful, step-by-step instructions. During the installation process, you can import existing Schwab accounts, along with data from Quicken and StreetSmart.

One of e.Schwab's primary advantages is its discounted trading for Schwab accounts.

For each online trade, e.Schwab charges \$29.95 for the first 1,000 shares and 3 cents for each additional share. This is less than traditional brokers' charges, which vary but can easily exceed \$50. You can also use e.Schwab to check the status of your orders, and you can even cancel them should you have second thoughts.

For basic portfolio management, e.Schwab lets you obtain the latest quotes online, then update your portfolio with them. If you have a Schwab account, you get 50 free quotes for every trade you make, and you pay \$1.45 for each additional minute of use. Also, you

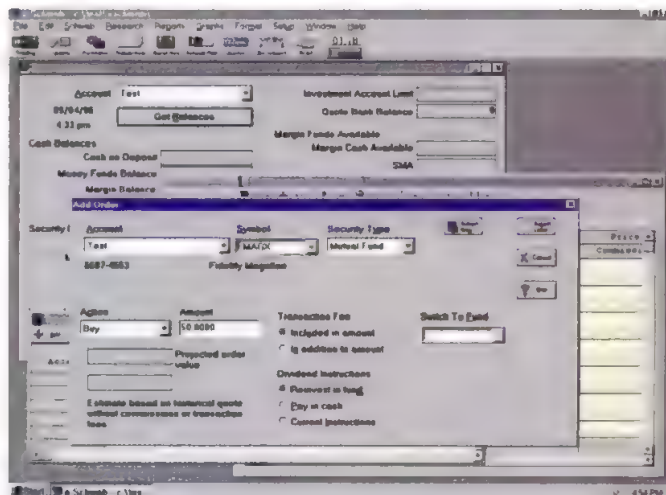
can use e.Schwab to send e-mail to the Schwab customer-service office (which, if nothing else, saves you the cost of calling in). But e.Schwab does not offer any performance analysis for such information as rate of return.

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REPORT CARD

e.Schwab Online Investing

	Power	Ease
Setup	B	B
Information gathering	C	B
Analysis	D	B
Portfolio management	B	C



FREE AND EASY e.Schwab Online Investing is free, easy-to-use software that works best with Schwab's online financial services.

poses. Also, e.Schwab can track prices according to conditions you set (such as a specific price point for a stock to reach). You do, however, have to check for these alerts manually. Another downside of e.Schwab is that it offers no automation features. For example, you cannot schedule the program to download updates automatically.

For reporting, e.Schwab offers only a handful of basic reports that list your securities, transactions, income, portfolio, and gains and losses. It can track information for use on a Schedule D tax form. The program's graphing capabilities are rather sparse—particularly when compared with those of a high-end package, such as Window on WallStreet Professional Investor 5.0.

For research, e.Schwab's Mutual Fund Performance Database, based on Morningstar data, can help you quickly locate mutual funds that meet your investment criteria. You can use it at no charge. But e.Schwab does not provide news clippings, nor does it offer databases with fundamental and technical information.

For fundamental information, you'll need to turn to Reuters Money Network, which is included with e.Schwab but costs a monthly fee (from \$6.95 to \$29) after the first month.

As a front end to Schwab's online trading services, e.Schwab works fine. But for general investment management, you'll want to look elsewhere.—Wayne Kawamoto
e.Schwab Online Investing. List price: \$6.95 (for shipping and handling). Charles Schwab & Co. Inc., San Francisco; 800-362-6789; www.eschwab.com. Circle 461 on reader service card.

Editors' Choice

- Window On WallStreet Professional Investor 5.0
- Reuters Money Network



The investment software packages we reviewed comprise two categories: high-end products with so-

phisticated data-analysis features, and low-end, less expensive programs that place much less emphasis on analysis. So we chose two Editors' Choices, one in each group, although each product can appeal to users interested in both categories.

In the first group, we recognize Window on WallStreet Professional Investor 5.0 as our high-end Editors' Choice. Though designed (and named) with the serious investor in mind, this product is well-rounded enough to suit users with any level of investment experience. It offers enough automated data-gathering and analysis tools to please the professional investor, while the easily understood interface and instructional tools can ease the way for the less experienced. And if this version of the package does prove too complicated for some users or is simply too expensive, two lower-end (but still impressive) variations of Window on WallStreet are available.

Wall Street watchers who don't plan to put their holdings under a microscope but still want to update and maintain their portfolios frequently should look at our second Editors' Choice, Reuters Money Network. While it lacks technical analysis tools, Reuters' comprehensive database, excellent portfolio management features, and usability make for an excellent combination. And like Window on WallStreet, Reuters offers enough value (particularly in terms of its vast informational resources) to appeal to novice and veteran investors alike.

MicroQuest

Inside Track

If your investment needs and level of expertise call for a simple portfolio manager and data updater, MicroQuest's Inside Track may be the program for you. Inside Track comes in two varieties: one for use with CompuServe (\$49.95) and the other for the Internet (\$79.95). Both of them offer simple tools to help you analyze historical data on securities, and both run a limited number of reports and graphs. But their strong suits are creating portfolios, automatically updating them with

recent quotes and news, and apprising you of investment developments. If you need to do any kind of serious analysis, or if you're a novice who would like some friendly guidance, you'll need to look elsewhere.

Though Inside Track's feature set is geared to beginners and intermediate investors, its help and setup routines are not. For example, it doesn't walk new users through the process of setting up the software. Instead, you must work your way through the setup

menu, filling in information about your modem and your account. (Online help is available for most of these steps, and almost half of the skimpy manual deals with these early issues.) Also, Inside Track offers no basic guidance for novices who might need to develop a better understanding of the stock market.

MicroQuest offers two versions of Inside Track because you can download quotes and news either from CompuServe or from Quote .Com, a well-known investment site on the Internet. You can direct Inside Track to check for data at specified intervals, ranging from once a day to every 15 minutes, and you can indicate the information you want (such as price and change by percentage). The program displays this downloaded data on the QuickView screen. You can also choose to view a security's history either in graph form (as Hi-Lo-Close or Volume charts, in daily, weekly, or monthly increments) or in more detail.

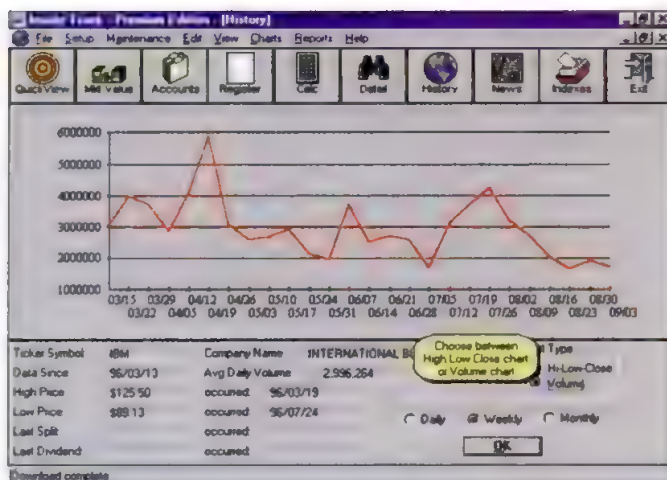
Inside Track lets you establish break points: the dollar level or percentage of change at which to trade with a given stock. It also lets you set an alarm on your computer to notify you of a break point, and the CompuServe version even allows you to receive remote notification of such events via your pager.

The analytical capabilities offered by Inside Track are among the weakest in the roundup. You can generate three types of charts (portfolio mix, relative price change, and general account) and four kinds of reports (daily issue data, short-term gain, portfo-

REPORT CARD

Inside Track

	Power	Ease
Setup	B	B
Information gathering	B	B
Analysis	D	B
Portfolio management	B	B



HIGHS AND LOWS Inside Track generates historical price charts of either high-low-close or volume data on a daily, weekly, or monthly basis.

lio value, and cost basis versus current value).

So while Inside Track is designed for beginners—and is relatively simple to use, once you configure it properly—it is not a well-rounded product. Its lack of guidance and dearth of analytical tools make it inappropriate for anyone who especially requires either feature. But investors who want bare-bones portfolio tracking and securities updating, along with remote or local notification, may find Inside Track a match for their needs.
—Kathy Yakal

Inside Track. List price: CompuServe version, \$49.95; Internet version, \$79.95. MicroQuest, Lenexa, KS; 800-345-3950, 913-438-2155; fax, 913-888-6928; www.microquest.com. Circle 462 on reader service card.

Intuit Inc.

Investor Insight

It's no fluke that Intuit has won the hearts and the checkbooks of millions. Year after year, Quicken has remained the market leader in personal finance software. And when Intuit developed

Investor Insight for personal investors, it used the same formula. Included in Quicken 5.0 and free as a download from one of Intuit's Web sites (www.qfn.com), Investor Insight beats every competitor hands-down in terms of easy setup and use. Also, it offers enough tools for portfolio tracking, information gathering, and analysis to please novice and intermediate users. But more serious investors will have to look at higher-end products for more sophisticated securities analysis.

EasyStep, which Intuit pioneered in TurboTax, eases users through setup. (It appears again every time you create an advanced portfolio.) The first time you click on the Call icon, the program walks you through the process of setting up your modem. A tool called Autoconfigure, the kind of feature that should be part of every program using a modem, makes this a no-brainer.

Investor Insight does not let you use different data sources: You must sign up for Intuit's.

You can do this easily using a credit card and online registration. Updates cost \$9.95 a month for up to 10 securities and \$19.95 a month for up to 50; Standard & Poor's company reports are \$4.95 each. You can also obtain mutual fund reports from another of Intuit's Web sites (www.galt.com). News and quotes are free. In addition, you can configure the program to update this information at the same time every day.

Portfolio management is one of Investor Insight's strengths. You can have it read and update data entered in Quicken, or you can create your own simple or advanced portfolios in Investor Insight itself. Simple portfolios calculate the value

of your securities and gains and losses; they are designed for traders who don't update regularly. Advanced portfolios

let you examine your holdings' performance using more sophisticated measures, such as time-based performance and security tracking by lot and by time of purchase.

Investor Insight can't compete with the high-end analysis products in this story, though it offers basic charting capabilities that may suffice for casual investors. The most useful chart deals with price volume; it plots a security's high, low, and closing prices and its trading volume. You can display index charts for the Dow Jones Industrial Average or the Standard & Poor's 500 index, and company preview charts that show historical data. And three kinds of comparative charts help you evaluate your portfolio's performance.

REPORT CARD

Investor Insight

	Power	Ease
Setup	A	A
Information gathering	B	A
Analysis	D	B
Portfolio management	B	A

REPORT CARDS

Reading the Report Cards

We graded each of these seven packages for both power and ease of use in four categories. We used the following grades: A, excellent; B, above average; C, average; D, below average; E, failing.

Computer lingo can be complex enough; when you add investment jargon and procedures, a product's **setup** process needs to be as simple as possible. Products that scored well in this category were easy to install and configure and clearly explained modem setup and online connectivity.

Fast, easy **information gathering** options are crucial to

electronically managing investments. Products scored the highest if they offered multiple options for online securities and news information, if they had automated data-collection sessions, and if they notified users of specified events.

Products that scored well in **analysis** offered an exceptional number of ways to chart downloaded data. The best products allowed users to apply numerous financial formulas for analyzing trends in each security.

Products that provided a framework for **portfolio management**, or offered an easy link to other portfolio management software, scored well in our final category.

This holiday give someone Back-UPS[®] Office[™] and they'll thank you 120 times a month

Take the **Multipath Quiz** for a chance to win a **\$2,000 Shopping Spree**



The holiday season is a happy time, unless the overload of flashing lights or a starting furnace causes a power sag. Then your computer pays the price for holiday cheer. A recent study by IBM showed that the typical computer experiences power problems 120 times a month. In fact, corrupt power is the largest single cause of computer data loss and hardware damage.

Back-UPS Office provides reliable power for your entire system. Instantaneous battery backup ensures uninterrupted operation of your CPU, monitor and an external storage device. Full-time surge suppression and site-wiring fault protection spreads a true Multipath safety net under any remaining integrated peripherals, like modems, printers, fax machines and phone systems. Back-UPS Office also provides convenient BlockSafe[™] outlet spacing to handle all size plugs – even large transformer blocks.

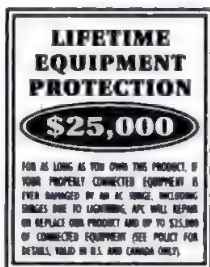
Unique Multipath protection keeps your PC and data safe

Plugging a phone line into your computer doubles your vulnerability to power problems; add any peripheral, and it triples. Even if your AC power-line is shielded, when a surge hits an unprotected peripheral, it can blaze down serial cables and datalines, and toast your expensive PC.

Back-UPS Office protects your entire system

Until now, protection for your entire system required several devices. But multi-device protection can leave you vulnerable to line noise and unwanted data glitches created by the voltage differential between outlets. Those glitches are prevented with the Back-UPS Office common voltage reference.

Back-UPS Office means true Multipath protection, clean, safe power to every peripheral, and instant battery backup to keep your cutting edge system and O/S from crashing. It means protection for less by integrating the security of a surge suppressor with the power of a 250 VA UPS, guaranteed up to \$25,000 (see policy for details).



FOR AS LONG AS YOU OWN THIS PRODUCT, IF YOUR PROPERLY CONNECTED EQUIPMENT IS EVER DAMAGED BY AN AC SURGE, INCLUDING SURGES DUE TO LIGHTNING, APC WILL REPAIR OR REPLACE YOUR PRODUCT AND UP TO \$25,000 OF CONNECTED EQUIPMENT (SEE POLICY FOR DETAILS, VALID IN U.S. AND CANADA ONLY).



"...for any PC today—especially if you run your business on it — [a UPS] is an indispensable peripheral." — PC MAGAZINE

APC has won more awards for reliability than all other UPS vendors combined.



NEC's Ready Office[™] delivers unmatched reliability and low costs of ownership with a business's combination of CPU performance and data storage. And legitimate entry into comes with the world's most reliable power protection. APC's Ready Office[™] Multipath Back-UPS Office[™] That means Ready Office[™] is the world's most reliable system. Right out of the box. To learn more about the NEC Ready Office[™] product line, featuring automatic transfer switch features, please call 1-800-521-4616 or visit the NEC Web site at www.nec.com.

APC Multipath Quiz Rules:

Follow the instructions on the reply card for a chance to win a shopping spree at a participating store (listed below):

Prizes:	
First:	\$2,000
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Third:	\$500

Complete the quiz at www.apc.com and be entered in a second drawing for a free t-shirt! All entries must be received by 12/01/96. Drawing to be held 12/15/96.



WIN A \$2,000 SHOPPING SPREE!

Answer the quiz questions correctly (Hint: Answers are in the ad), fill out the information below completely and send to APC or enter from our PowerPage[™] on the Web, for a chance to win a \$2,000 Shopping Spree. We'll send you a Free 60 page Power Protection Handbook just for trying.

- Multipath power protection means surge suppression on...
☐ Dataline ☐ Computer AC ☐ Peripheral AC ☐ All of the above
- APC insures surge damaged equipment properly attached to a Back-UPS Office up to...
☐ \$1,000 ☐ \$5,000 ☐ \$25,000
- If I plug my external modem into a surge suppressor and the dataline into the wall, my computer is safe from power problems. ☐ True ☐ False
- My transformer block plugs will fit Back-UPS Office without covering an extra outlet ☐ True ☐ False

Name: _____ Title: _____

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Address: _____

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Phone: _____ Fax: _____

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Is this your first contact with APC? ☐ Yes ☐ No I am an ☐ End User ☐ Reseller

of workstations on site/sold per month: _____ Brand of UPS currently used/sold: _____



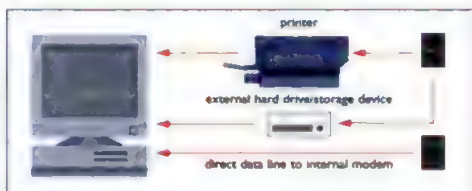
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"Protect ME! with APC".



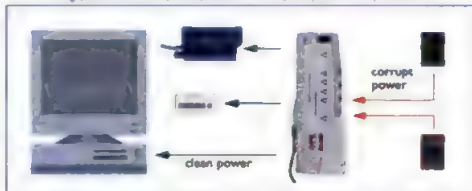
Steve Richbourg
Senior Power Quality Engineer
Gulf Power Company

"I just got my first Back-UPS Office. I've purchased seven since because people keep stopping by my desk and saying they want it! Recommending power protection is what I do for a living, and I've never had an upset customer in more than four years recommending APC."

Multipath Means Total Power Protection



Bad power (red) can enter a computer system through multiple paths: eg. Printer, data and phone/fax lines - even if computer A/C is protected



The Multipath protection of Back-UPS Office™ shields your peripherals and guards your computer from bad power on every path, providing clean, safe power (green), to your entire system.

Back-UPS Office award-winning features:

Integrates the Security of a Surge Suppressor with the Power of a UPS

Six outlets guard your hardware with full-time surge protection. Three of the six outlets provide instantaneous battery backup to keep your system from crashing in the event of brownout or blackout.

Internet Ready Fax/ Modem Protection

Back-UPS Office's built-in phone line/10 Base-T network cable surge protection prevents surges from damaging internal & external modems, motherboards, 10 Base-T lines, input/output cards, and other system components.



Convenient BlockSafe™ Outlet Spacing

Back-UPS Office's outlets are spaced to accommodate all size plugs, including large transformer blocks.

Master On/Off Switch

One switch conveniently controls power to entire connected system.

Electrical Wiring Fault Indicator Saves Trouble and Expense

Without a proper ground, most surge protection is useless. Back-UPS Office alerts you to wiring problems such as a missing ground and reversed polarity, two common miswirings which otherwise would require an electrician's visit to diagnose.

CIRCLE 162 ON READER SERVICE CARD OR GO TO WWW.PCMAG.COM/BuyerLink

Circuit Breaker

Provides protection in the event of an overload or short circuit; no fuse, no hassle.

Check Battery Warning Prevents Downtime Before it Occurs

An LED signals when Back-UPS Office's internal self test finds the battery near the end of its life, giving you 6-8 weeks warning.

\$25,000 Equipment Protection Policy

If your properly connected equipment is ever damaged by an AC surge, including surges due to lightning, APC will repair or replace our product and up to \$25,000 of connected equipment for as long as you own your Back-UPS Office. (See policy for details.)

User Replaceable Batteries

Back-UPS Office has user replaceable batteries that can be easily swapped out, saving time and expense: no need to return the UPS to the factory for service. Batteries last 3-6 years under normal usage.

2 Year Warranty

Unmatched reliability means you can purchase all APC products with confidence.

CHOOSE THE RIGHT APC PROTECTION

- For advanced PC protection, including automatic voltage regulation, CellGuard battery management and phone line/10BaseT protection, choose the Back-UPS Pro. For longer runtime choose a higher VA rating.



BACK-UPS PRO ADVANCED PC PROTECTION:

For Pentium, 486, Win 95, and Business Applications

Volt-Amp Rating	List Price	Runtime*
2800PNP	\$199	6 min.
4200PNP	\$339	8 min.
6500PNP	\$419	17 min.
1000 ^{PM}	\$589	35 min.
1400 ^{PM}	\$759	74 min.

- For Multipath PC and peripheral protection, choose new Back-UPS Office, featuring 6 outlets with guaranteed surge protection, 3 of which provide instantaneous battery backup, fax/modem protection, and BlockSafe™ outlet spacing for the accommodation of all size plugs and transformer blocks.



BACK-UPS OFFICE MULTIPATH PROTECTION:

For 386, entertainment, education & all peripherals

Volt-Amp Rating	List Price	Runtime*
250	\$179	10 min.

- For Basic PC protection, choose from the Back-UPS family (software not included).



BACK-UPS BASIC PC PROTECTION:

For 286, 386, Entertainment, and education

Volt-Amp Rating	List Price	Runtime*
200	\$119	-
280	\$139	7 min.
400	\$199	13 min.
450	\$254	24 min.
600	\$359	31 min.
900	\$529	47 min.
1250	\$689	75 min.

- For Fileserver protection, ask for our award-winning Smart-UPS® line (not shown).
- For Datacenter protection, ask about our Matrix-UPS line (not shown).
- For hardware-only surge protection, ask for APC's SurgeArrest™ line (not shown).

*Runtime shown is for typical Pentium desktop system and may vary with your actual load.
Note: Back-UPS 200 not recommended for Pentium systems
**Does not include FREE PowerChute Pro Power Management Software.

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something to scream about.

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the S3d logo. It revs all 3D and 2D games and software,

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software, the results are extreme: the best 2D graphics,

the most realistic 3D, and an affordable price.

The Where: Seek S3d on computer systems like

Compaq, Dell, Hewlett Packard, and Packard Bell.

Find S3d on accelerator boards from Diamond Multimedia,

Number Nine, and STB. Demand S3d on games from

Interplay, Activision, Eidos, Mindscape and on titles like

Descent II,[™] MechWarrior 2,[™] Confirmed Kill,[™] and MegaRace 2.[™]

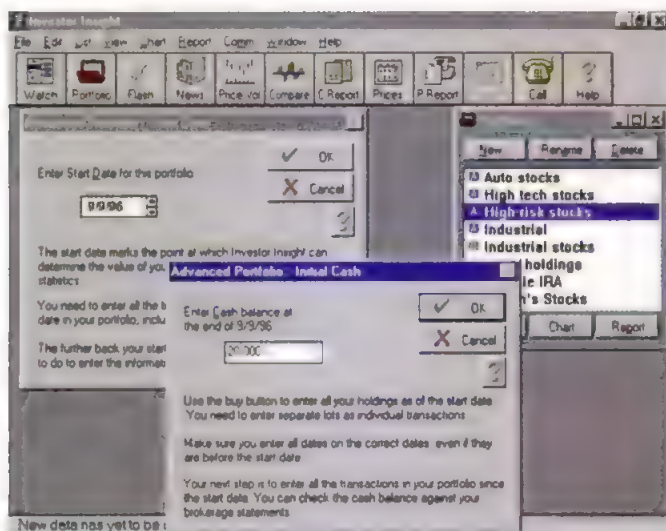
The Why: Because you want 3D so real it screams.

hit our web site for the real stuff: seek.s3.com

S3d is compatible with Windows 95, Windows 3.1, Windows NT,[™] and OS/2.

CIRCLE 289 ON READER SERVICE CARD.





IF IT AIN'T BROKE Investor Insight is remarkably easy to use, thanks to the same well-designed interface we see in other Intuit products.

Once again, Intuit has built a product whose usability and simplicity will appeal to many PC users, both novice and sophisticated. But it's not the best choice for those who continually analyze and manipulate their portfolio data.—KY

Investor Insight. List price: Download, free; up to 10 on-line updates, \$9.95 monthly; up to 50, \$19.95. Intuit Inc.,

Mountain View, CA; 800-446-8848, 415-944-6000; fax, 800-756-1040; www.qfn.com. Circle 463 on reader service card.

Equis International Inc.

MetaStock

If you need absolutely top-notch technical analysis of your investments and want to work on them in a sturdy, capable environment built for

Windows 95, you can't beat Equis International's MetaStock. The most recent version, designed for the 32-bit environment, serves up more charting features and analysis tools than the earlier, well-respected versions. Moreover, MetaStock supports the most data sources of any product in this group. But it is also the most expensive, at \$349.

MetaStock's brief tutorial introduces you to the program's primary analysis tools. But the program doesn't do more to ease new users into its functions or to provide guidance.

Most of the setup takes place in the Downloader module, the data collection program includ-

ed with MetaStock. Here you set up your modem (if necessary) and choose a securities vendor via tabbed dialog boxes. The program supports seven vendors: CompuServe, DBS Signal, Dial/Data, Dow Jones, MarketScan Plus,

Reuters Trend DataLink, and TeleScan. As far as automated data updates go, you can schedule only one per day.

Once you have captured price information, you can manage it by building charts, layouts (groups of charts), or templates (saved sets of indicators and other defining information that you can apply to charted securities). In addition, a number of powerful tools let you analyze the data. You can drag and drop an unlimited number of prices and more than 80 indicators into a

chart, on which you can also display multiple securities. Line studies are easy to construct using one of the program's many toolbars. Each

chart can display 32,000 data points, and you can view over 100 years of price data.

Need more tools? The Expert Advisor feature slices and dices the movements of your securities, offering commentary from industry gurus, informed

REPORT CARD

MetaStock

	Power	Ease
Setup	B	C
Information gathering	C	B
Analysis	A	B
Portfolio management	E	E

Ask the Experts



If you find the jargon in most technical analysis investment software confusing, from *Bollinger Bands* to *Gann curves*, you'll be happy to learn that two new packages aim to make this subject a whole lot simpler for you. Omega Research and

Equis International have incorporated expert systems into new versions of their popular SuperCharts and MetaStock charting programs (respectively). Expert systems are sophisticated artificial-intelligence systems that provide users with helpful feedback based on a predefined set of rules. In these two products, expert systems translate the market calls of technical indicators into plain English and give advice about specific topics and situations.

Omega Research's SuperCharts, Version 4.0 (\$295, 305-270-6996, 800-430-5580), includes an on-screen Expert Analysis Bar, which provides one-click access to video-based footage of legendary traders Larry Williams and Tom

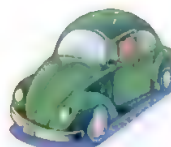
DeMark. Once a security is charted against an indicator (such as "moving averages"), you can click on the Expert Analysis Bar to pop up a short video clip of Williams or DeMark commenting on actual trading signals. Their remarks are based on SuperCharts' expert system, which appeared in previous versions of the program as text-only blurbs of commentary.

Equis International's MetaStock (reviewed in this story) doesn't provide you with multimedia-based expert analysis, but it does offer a text-based variety of the kind of rules-based expert analysis that SuperCharts offers. MetaStock also uses an underlying expert system based on the trading strategies of top investment names, such as author John Pring. Once you have brought a chart and indicator on-screen, you can pop up the text-based trading advice in a window over the chart. While Equis's approach isn't as glitzy as the video clips in SuperCharts, the text-based system in MetaStock provides for a healthy supply of canned advice—probably more than adequate for most personal investment needs.—*Sebastian Rupley*

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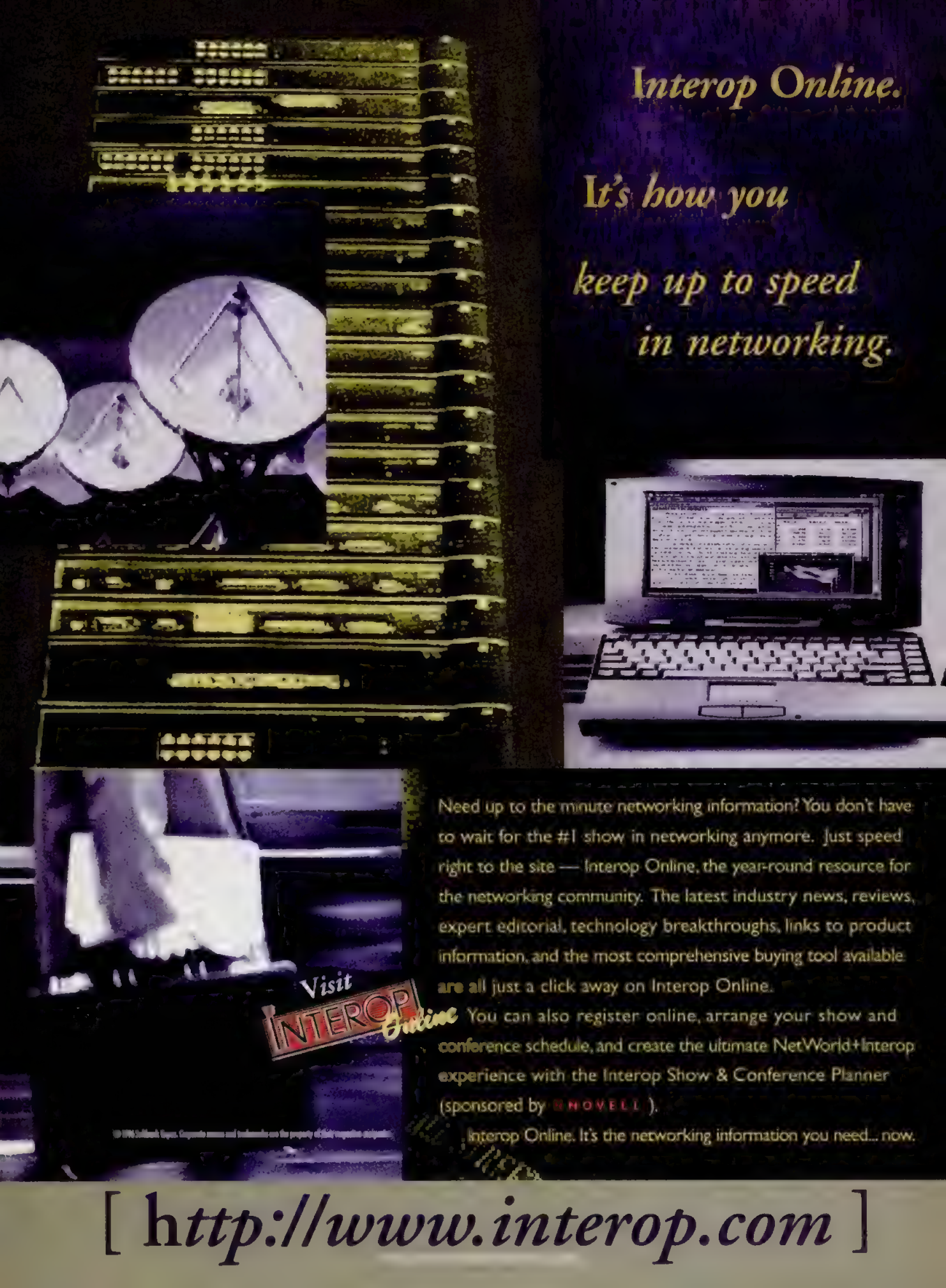
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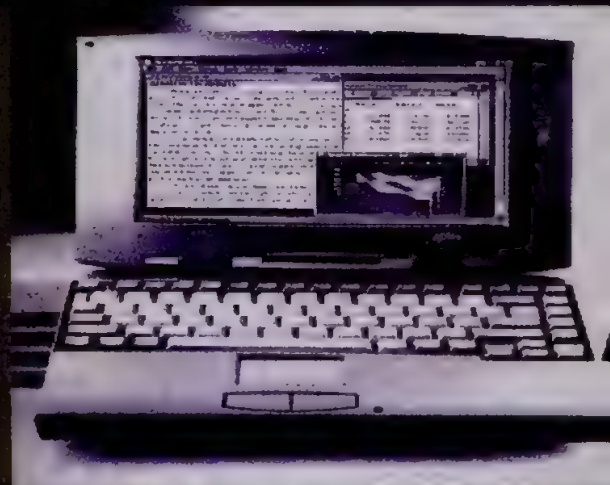
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An Online Service for Investors



Whether or not you employ one of the investment software packages reviewed in this story, you could benefit from the voluminous amount of financial research material that's available through the Dow Jones News/Retrieval online service.

Dow Jones gives you access to more than 55 million articles from over 3,200 business, trade, and news publications. In addition, you can pull down reports on over 10 million companies and access quotes from every major exchange.

Dow Jones lets you enter a search keyword or term, specify what part of the articles you want to examine (such as headline or lead paragraph), pinpoint a date range, and select the

analysis, and suggestions as to how current trends should affect your portfolio. Other features let you search through securities to generate buy and sell signals, apply "what if" scenarios to options, and create customized indicators.

While MetaStock is short on guidance for new users, it's long on nuances that can make your use of the program a bit smoother. For example, it uses right-click menus extensively, and OLE 2.0 support simplifies exchanging data with OLE-enabled programs.

MetaStock does not include any portfolio management or

online trading tools, though it offers two unusual Internet-related capabilities. If you right-click on a price chart and select Internet and then Current Quote, Metastock invokes your default browser and calls a Web site so you can grab 20-minute-delayed quotes. Also, the program can save charts in HTML format.

MetaStock is not cheap and is not for beginners. But its highly sophisticated technical analysis tools, together with an interface that uses Windows 95 quite well, are a tough combination to beat.—KY

MetaStock. List price: \$349.

publications to search. You can set up topic-based folders and organize search results for news topics you regularly check.

In addition, Dow Jones lets you set up portfolios whose prices are updated online, and you can link to current news stories about your investment holdings. A powerful screening tool lets you find companies whose financials meet your search criteria, such as profit margin. You can also obtain company reports and financial profiles.

Information fees range from 15 cents per quote and \$4.95 per Tradeline screening report to \$49.95 for a Dow Jones Company Report. Software, searches and headlines in the Publication Library, and an online newsletter are free, though, and there are no connect-time charges.—KY

Equis International Inc., Salt Lake City; 800-882-3040, 801-265-8886; fax, 801-265-3999; www.equis.com. *Circle 464 on reader service card.*

Reality Online Inc.

Reuters Money Network



With first-rate portfolio management and comprehensive database resources, Reality Online's Reuters Money Network is an excellent investment solution that's fairly easy to use. Its only drawback is a lack of technical analysis tools.

Reuters Money Network is easy to set up. In terms of its features, the heart of the program is its powerful research database, which can help you locate potential investments: stocks, mutual funds, and bonds, based on your criteria. The software comes with a database on CD-ROM, and Reality Online will send you the latest version of it when you register the software. Also, depending on the sub-

scription service that you choose, you can download a predetermined number of monthly updates.

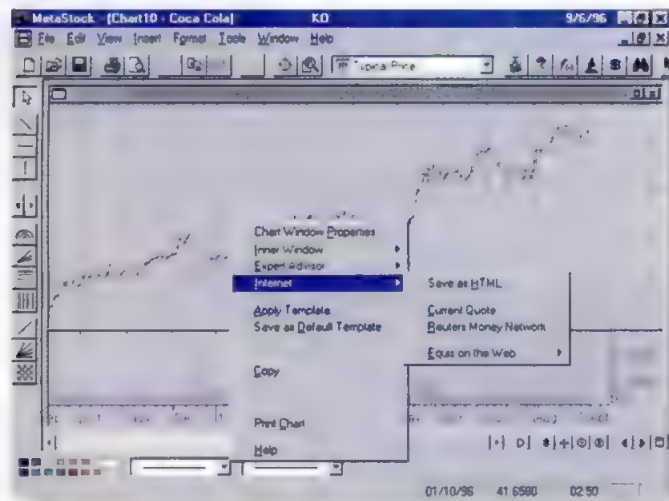
You can access the online database to obtain fundamental information, including 52-week and 100-day historical pricing from such sources as Standard & Poor's and Morningstar. And when you need even more detailed information, such as news, market analysis, industry overviews, or company specifics, you can purchase Standard & Poor's Premium Reports via the database, at \$4.95 each.

In addition, the software comes with a Newspaper Clipping feature. It compiles stories on investments and other topics of your choice from sources

such as Knight-Ridder and Reuters News.

The monthly charges for Reuters begin at \$6.95, a price that includes up to 4,000 quotes

and access to major news articles. The high-end plan, which costs \$29.90 per month, adds access to databases containing stock, bond, mutual fund, and money-market research; historical pricing charts for up to

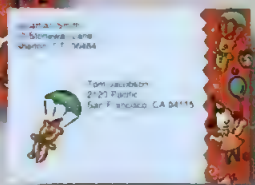


SUBTLE BUT EFFECTIVE Extensive use of right-click menus and clean, descriptive toolbars enhance MetaStock's usability.

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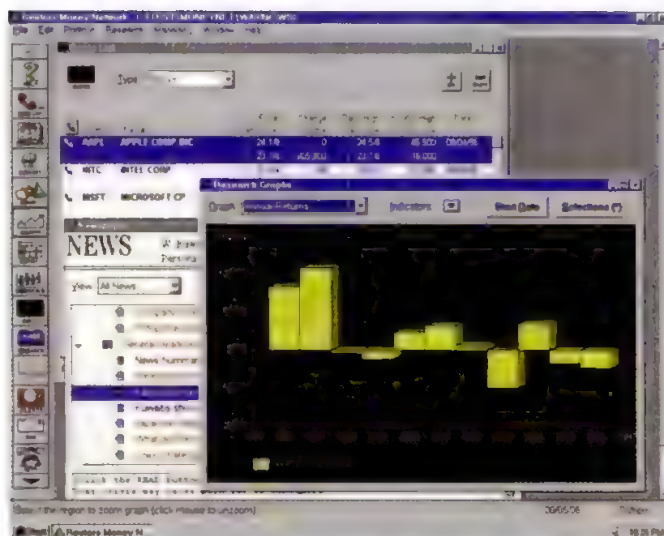
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VAST RESOURCES Reuters Money Network offers extensive CD-ROM and online databases as well as other solid features.

10 stocks and indices; and up to 1,000 news clippings.

You can record all your transactions, and the program updates your portfolio based on the latest prices. (Some other packages, such as e.Schwab, include Reuters Money Network but use only the service's vast databases, not its portfolio management features.)

Reuters' reporting capabilities are fairly comprehensive. It can list accounts, holdings, transactions, and open and closed lots and securities, along with your interest, dividends, and capital gains. You can also track tax-related information for use on a Schedule D form. Charting capabilities are fairly impressive, and the program graphs cumulative returns, investment performance, value and contribution, and comparisons against indicators. Also, you can set the software to alert you to certain changes in investments and indicators.

Except for the lack of technical analysis, Reuters Money Network shines as an intuitive, feature-rich product.—*WK*
Reuters Money Network. List price: \$24.95; online charges, \$6.95 to \$29.90 per month. Re-

ality Online Inc., Norristown, PA; 800-346-2024, 610-650-8600; fax, 610-650-8170; www.money.net.com. *Circle 465 on reader service card.*

Telescan Inc.

Telescan Investor's Platform

Like a loyal advance scout, Telescan Investor's Platform offers powerful search features that can ferret out investments from its thorough online database. In addition, it can provide equally comprehensive fundamental and technical analysis. But don't look to this program for online trading or portfolio management. And for a product that does not have these key features, Telescan is expensive.

The program is relatively simple to install and use—at first. Its heavy use of sophisticated financial terms may overwhelm investment newcomers. And although a short tutorial helps you through a typical online session, inevitably you have to rely on the very technical manual for more complex matters.

The program offers a search-



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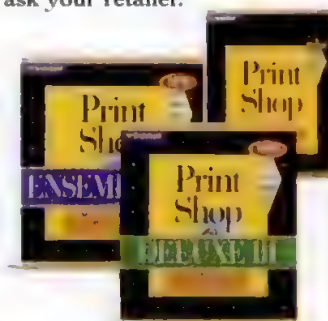
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able database of business news and data, so that you can obtain in-depth fundamental investment information. It can provide data on earnings, projections, dividends, and lots

more, from sources such as Zacks Investment Research, the Securities & Exchange Commission (SEC), and Standard and Poor's. At extra cost you can also access services

such as SEC Online.

For complete technical analysis, Telescan offers comprehensive plotting capabilities; it can chart data relating to stocks, mutual funds, options, and market indexes. For convenience, you can configure the program to retrieve technical data automatically. Telescan can also locate late-breaking news related to your investments.

Besides fundamental and technical analysis, Telescan offers ProSearch, a sophisticated stock-screening system. Employing 21 different strategies, ProSearch can look for stocks according to 207 criteria—including beta, current ratio, and gross profit margin—and can search for mutual funds using

82 similar criteria.

On the other hand, the software lacks portfolio management, although the vendor will sell you a DOS manager if you purchase the full package for \$395.

Still, if you are looking for a package that can search for investments in almost any conceivable way and that can provide

in-depth fundamental and technical analysis, Telescan Investor's Platform is a worthy tool.—WK

Telescan Investor's Platform. List

price: Analyzer Module, \$199; ProSearch Module (including Analyzer), \$349. Telescan Inc., Houston; 800-324-4692, 713-588-9700; fax, 713-952-4238; www.telescan.com. Circle 466 on reader service card.



EXPERT TRACKER Telescan Investor's Platform has great search tools and analysis capabilities, but no portfolio management features.



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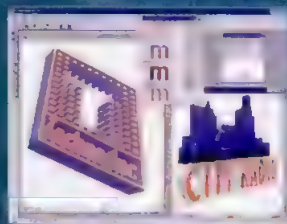
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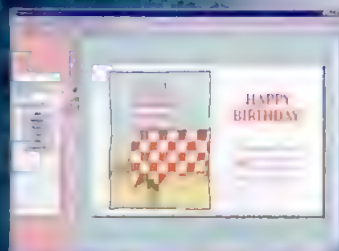
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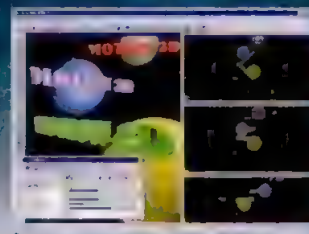
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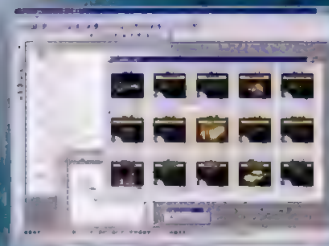


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Window on WallStreet Inc.

Window on Wall-Street Professional Investor



While none of these products cover all the bases that a given investor might want to tag, Window on WallStreet Professional Investor 5.0 covers more than most.

The product links to Intuit's Quicken for portfolio management, and it allows you to download data both from online data services and from its own quarterly CD-ROM service (\$15 per CD-ROM). At \$295, Window on WallStreet is one of the most expensive titles that we reviewed, but its powerful features help make up for the initial cost.

Window on WallStreet is not difficult to set up if you're willing to drill down through a few dialog boxes. The product works with three online data services, and it includes sign-up information for all three: CompuServe, Dow Jones News/Retrieval, and Dial/Data.

Window on WallStreet's impressive analysis capabilities let you analyze your data using numerous charting tools. More than 100 indicators are built in, as are several trading systems. You can create your own indicators and ask the program to alert you to any specified market conditions. The SmartScan feature automatically scans securities and charts for information you've requested.

The product's Personal Investment Assistant lets you schedule events to occur auto-



While it's true that Microsoft has no investment software package, the company did unveil a useful related Web site last summer, Investor 1.0 (www.msn.com/investor). By the time you read this, version 2.0 should be available, and it will include a few significant enhancements.

Investor 1.0 offered a small subset of the features you'll find in some of the more mature investment packages in this story. It offered 20-minute-delayed quotes and a summary of the major market indices (S&P 500, Dow Industrials, NASDAQ Composite, and so on). It also provided financial data on the market's "top" ten companies in five categories (most active, leading gainers and losers by points, and leading gainers and losers by percentage) for three exchanges (NYSE, AMEX, and NASDAQ).

What new and exciting toys can you expect to find in Investor 2.0? Encryption is the most

thorough stock-market research and analysis programs available. It has enough novice guidance and other investment tools to make it the best of the bunch—even at the high price.—KY

Window on WallStreet's assistance for new investors is exceptional, and it might be especially helpful for the home user. The program's interface makes life easy on the user as

well. It implements right-click help well, particularly as to the charting functions.

If you don't plan to run extensive analy-

ses on your securities information, you may be better off using one of the two other versions of Window on WallStreet, the Personal (\$49) or the Deluxe (\$129) package. But Window on WallStreet Professional Investor 5.0 is one of the most competent,

notable new feature. Investor 1.0 did not encrypt any of the portfolio information you sent across the Internet using the site. In 2.0, you'll be able to build portfolios in a Java applet, so while your personal stock data will seem to be vulnerable, right in the middle of the Web page and thus live on the Internet, it won't be. In addition, Investor 2.0's Portfolio Manager is expected to support stock splits, multiple purchase dates, and news links for stocks in your portfolio.

Using Investor 2.0, you'll also be able to link easily to other Web sites for pertinent financial news and to create your own customized personal news pages. You'll also be able to create and customize split-adjusted historical charts for any security.

Microsoft plans eventually to incorporate online trading into Investor, in addition to other investment-related tools. One type, advanced research tools, may eventually be a fee-based service. But at least for the time being, Microsoft Investor is free.—KY

sional Investor 5.0. List price: \$295; CD-ROM updates, \$15 per disk. Window on WallStreet Inc., Richardson, TX; 800-998-8439, 972-783-6792; fax, 972-783-6798; www.wallstreet.net. Circle 467 on reader service card.

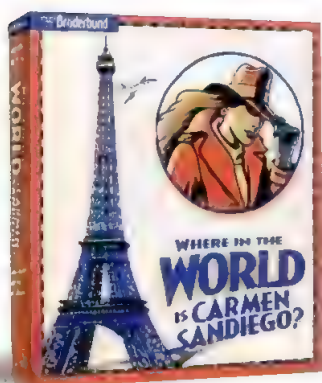
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Coming Up

PC Blockbuster

Two distinct levels of processing power have grabbed large sections of the PC market and merit separate looks, so we've divided our annual roundup of PC lines into two parts to cover them. The first level deals with the business mainstream, namely 200-MHz Pentium- and Cyrix 6x86-based PCs running Windows 95. There we put 51 systems from 41 different vendors through our newest benchmark tests—ZD Business Winstone 97 and ZD WinBench 97—searching for the best that will get your everyday tasks done fast without breaking your budget.

The second deals with the next step up in processing power: 200-MHz Pentium Pros running the latest, much-anticipated operating system from Microsoft, Windows NT 4.0. In this section we explore 39 of the fastest PCs from 38 vendors and put them through their paces with our new, all-32-bit benchmark tests, featuring ZD High-End Winstone 97. We conclude that the latest in power and technology can be surprisingly affordable: Some of the best systems averaged less than \$3,500.

To help you further in your search for a PC—whether it's for the home, a general business office, or a networked corporate environment—we've put together a handy pullout section with our recommended configurations for each of these types of PCs. We also supply a worksheet you can use to compare our suggested configurations with those you're considering.

Graphics Accelerators

The buzz right now in the mainstream graphics card market is 3-D support. But what does it mean? What does it buy you? And who needs it besides hard-core gamers? We test the new generation of 3-D-capable graphics cards to separate the facts from the hype. More important, we put the current 2-D and 3-D graphics cards through our new Winstone and Winbench benchmark tests to show you how well the cards will perform for your workaday Windows tasks.

Web Search Tools

What's the best way to find what you want on the increasingly sprawling World Wide Web? We examine ten major search sites on the Internet including AltaVista, Lycos, and Yahoo! and tell you how to find what you're looking for. Our tests reveal which sites do the best job of finding your desired information with minimal fuss. You'll also find out which sites offer the best power searching. We look at the increasing amount of original content offered on these sites. We also examine the trend toward specialized search tools, with looks at newsgroup search sites, White Pages services, and metasearch sites where you can query multiple search engines at once.

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452	MindSpring	MindSpring Enterprises Inc.	178
959	MultiModemZDXV	MultiTech Systems	NE25
422	MyDesk	Iota USA	76
435	MyInternetBusinessPage	MySoftware Co.	39
424	MyMailManager for Windows 95	MySoftware Co.	76
424	MyProfessionalMarketing-Materials	MySoftware Co.	76
453	Netcom	Netcom On-Line Communication Services Inc.	186
436	NetObjects Fusion	NetObjects Inc.	39
437	Netscape Navigator Gold 3.0	Netscape Communications Corp.	39
429	Nexar 9000 Corporate Series	Nexar Technologies	80
460	Nov*ix for Internet	Firefox Communications Inc.	197
411	On-Schedule 3.0 for Windows	Odyssey Computing	75
963	Pacesetter HDSL, Pacesetter SOHO	ADC Kentrox	NE25
418	PageOffice Color	UMAX Technologies Inc.	76
423	Pagis Pro 97	Xerox Corp.	76
431	Panasonic CF-62	Panasonic Personal Computer Systems	63
412	Picture-It	Microsoft Corp.	75
406	PowerEdge 2100	Dell Computer Co.	48
952	PowerRite Max 1000	Deltec Electronics Corp.	NE10
953	Powerware Prestige 1000	Exide Electronics Inc.	NE13
444	Prodigy	Prodigy Inc.	159
960	Proxy, Version 2	Funk Software Inc.	NE25
966	RangeLAN2 AP-II 7510 Access Point	Proxim Inc.	NE29
966	RangeLAN2 AP-II 7520 Access Point	Proxim Inc.	NE29
966	RangeLAN2 7400 PC Card	Proxim Inc.	NE29
465	Reuters Money Network	Reality Online Inc.	355
955	SmartPro 1050 Net	Tripp Lite	NE6
951	Smart UPS-1000	American Power Conversion Corp.	NE6
962	Solstice Internet Mail 2.0	Sun Microsystems Inc.	NE26
428	Sotec WinBird	Sotec America Inc.	80
454	SpryNet	CompuServe Internet Division	186
407	StreetSmart Pro	Charles Schwab & Co.	60
403	Survey Pro for Windows 2.0	Apian Software	66
404	SurveyWin 3.01	Raosoftware Inc.	66
967	Switchbox	Matrox Networks	NE29
415	SYS.230 Universal Personal Storage System	Olympus Image Systems Inc.	75
466	Telescan Investor's Platform	Telescan Inc.	357
414	UNIA	Vector Research Corp.	75
964	WANServices Manager	Stony Brook Software	NE26
458	WebRamp IPX Gateway	Trancell Systems Inc.	208
968	WebTrends 2.0	Software Inc.	NE20
455	Whole Earth Networks	Whole Earth Networks	189
467	Windows on WallStreet Professional Investor 5.0	MarketArts Inc.	362
442	WOW! from CompuServe	CompuServe Inc.	162
425	Y-SeeTwo Video Signal Splitter	P.I. Engineering	76
426	ZooWorks Personal Edition 1.02	Hitachi Software Products Group	80

NE—Network Edition.

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Abort, Retry, Fail?

THE LIGHTER SIDE OF PERSONAL COMPUTING

By Don Willmott

Next Stop: Documentation Hall of Shame

From the IBM ThinkPad 760CD manual's troubleshooting section:

"Problem: The screen is blank.

"Action: Verify that the suspend option to enter suspend mode when the LCD is closed is disabled. (Click on the Battery icon in the ThinkPad Features program; then follow the screen.)"

Fly 
Northwest
back in time.
(Northwest
Airlines
Web site.)

Flight Number :

001

Select the
day of departure:

☒ Yesterday ☐ Today ☐ Tomorrow

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RICHARD TENNANT

"TELL THE BOSS HE'S GOT MORE FLAME MAIL FROM YOU-KNOW-WHO."

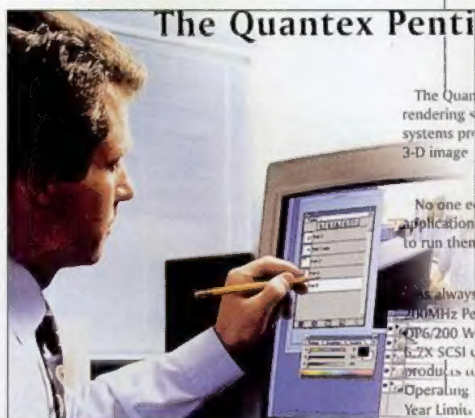
If your entry is used, we'll send you \$50 and a *PC Magazine* T-shirt. Send your entries to Abort, Retry, Fail?, *PC Magazine*, One Park Ave., New York, NY 10016-5802 or, via e-mail (text items only), to don_willmott@zd.com. Winners this issue: Dennis Brewer, Greg Burkhart, Stephen Cordes, Michael Elliott-Smith, Ben Gottesman, Lisa Minnick, and Rick Smutek.

AS400 version - is pretty well wrapped up, however the programmer had to leave to get his visa renewed and is having problems getting back into the U.S.A. We hope to be fully operational shortly.

 Shades of
Midnight Express.
(MicroBiz newsletter.)

And if You Don't Have a PC, Reboot It

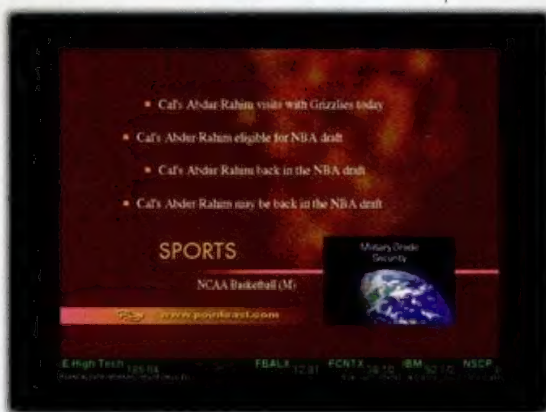
"If you don't have a modem, you'll have the option to send your registration over the Internet."—POWERISOFT DOCUMENTATION



The Quantex rendering systems provide 3-D image

No one ever application to run then
As always
200MHz Pentium
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E-7X SCSI
product, 1.5
Operating Year Limit.

 "Scratch scratch. Duh. Scratch scratch. Duh." (Quantex ad.)



 Hmm. Slow news day. (PointCast Network page.)

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